PRINCE

PLASTICS: A NEW CLASSIFICATION AND A BRIEF EXPOSITION OF PLASTIC SURGERY.

/ 50

DR. PRINCE'S NEW WORK,

Of 240 pages, on Orthopedic Surgery, recently published by Lindsay & Blakiston, Philadelphia.

The following extracts have been selected from the many favorable opinions which have been expressed:

OPINIONS OF THE PRESS AND OF THE PROFESSION.

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Letter from Prof. S. D. Gross, M.D., to the Publishers.

"S.-E. Cor. 11th and Walnut Sts.,
September 24th, 1866.

"GENTLEMEN:

"I thank you for the copy of Dr. PRINCE'S ORTHOPEDICS. The work is an excellent résumé of the existing state of the art and science of which it treats, and will, I doubt not, meet with the universal favor of the profession. The manner in which the treatise is gotten up, reflects credit upon your house. I am, gentlemen,

"Very respectfully, your friend,

"S. D. GROSS.

"Messrs. LINDSAY & BLAKISTON."

PLASTICS:

A NEW CLASSIFICATION AND A BRIEF EXPOSITION OF

PLASTIC SURGERY.

A REPRINT FROM A REPORT IN THE TRANSACTIONS OF THE ILLINOIS STATE MEDICAL SOCIETY FOR 1867.

BY

DAVID PRINCE, M.D.

"One great object of the Chirurgical Art, is in all common and operative wounds, to convert the existing external or open wound, which is unavoidably liable to the effects of inflammation and suppuration, into a safe internal, shut, or closed wound, where the processes of speedy healing and repair may go on by *immediate reunion*."—Sir J. Y. Simpson.

PHILADELPHIA:
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PREFACE.

A successful classification of any branch of knowledge, is such an arrangement of its component parts, as not only to make the whole easy of comprehension, but to secure for each minute division, a name showing its relations to the other divisions, and enabling it to be easily designated in descriptions.

The present essay, is an attempt to reduce the subject of Plastic Surgery to such a classification, as to give it an intelligible language, in which each division may be readily designated by a name having an invariable signification.

In the article on Plastic Surgery, in Holmes' Surgery, HOLMES COOTE, the author of it, says that in the construction of a new ala nasi, the surgeon "must trust to his skill and the circumstances of the case to guide his incision."

This is very much like a precept I used frequently to hear when a student attending lectures, that the disease under consideration should be treated on "general principles."

Such expressions arise, either from the want of definite ideas, or of definite language in which to express them. If this little monograph contributes such a *language* of Plastic Surgery, as to render descriptions hereafter easy, the writer will feel abundantly rewarded for his labor.

JACKSONVILLE, ILL., *November, 1867.*

ERRATA.

Page 4, 11th line from bottom. For Dr. Sampson read Dr. Simpson.

Page 13, 5th line from bottom. For prepartory read preparatory.

Page 13, bottom line. For dessication read desication.

Page 26, 17th line from top. For cremarter read cremaster.

Page 46, figure 16 is the original apparatus of Taliacotius, and figure 15 is Dr. Warren's modification.

Page 49. Explanation of figure 49, last line. For tissie read tissue.

Page 52, 10th line from bottom. For when read where.

Page 62, last line. For Chelins read Chelius.

Page 66, 6th line from bottom. Insert *not* before free.

Page 67, 16th line from top. For in read on.

Page 74, 13th line from top. For Dieffenback read Dieffenbach.

Page 79, last line. For anaplastry read anaplasty.

Page 80, 5th line from top. For affords read afford.

Page 81, 10th line from top. For integuments read integument.

Page 91, last line. For 1857 read 1859.

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PLASTICS.

INTRODUCTION.

PLASTICS, *Plastic* Surgery, Autoplasty, and Anaplasty, are terms used to denote the construction of parts to restore deficiencies.

As the statuary moulds his figures from inanimate material, so the surgeon moulds his parts from living tissue, giving them, often, widely different places, shapes and functions, from those originally pertaining to them.

A good definition of PLASTIC SURGERY, is that of T. SPENCER WELLS:—"That department of *operative surgery*, which has for its end, the reparation or restoration of some lost, defective, mutilated, or deformed part of the body."

It differs from orthopedic surgery, in accomplishing its objects by cutting or tearing, and by the exudations, adhesions, and granulations which follow, by which the parts operated upon are changed in their relations, while the methods of orthopedic surgery are chiefly by mechanism, posture, and exercise, and by such cutting processes, as come to the aid of mechanism and posture, causing parts to yield more rapidly than can be effected by mere force directly applied, and thus enabling the surgeon to save time.

Plastic surgery, as now understood, is altogether a modern art, growing out of recently acquired views of physiology and therapeutics. It is said, by those who have searched ancient writings, that some hints are found in Celsus, but they have to be interpreted by modern experience.

The occurrence of some deficiency, as the result of a religious

ceremony, or a form of punishment, led to the adoption, empirically, of some expedient to replace what had been lost. Thus, Galen describes autoplasty as applied to the reproduction of the prepuce, for those who wished not to be suspected of being Jews; and the special effort among many barbarous nations for the reproduction of the nose, grew out of the frequent loss of this organ, as a punishment.

Nothing like a scientific conception of the methods, conditions, and possibilities of the art, is older than the present century. It is, even now, in its infancy, and is to grow into maturity by a better knowledge of general and local therapeutics applicable to the healing of wounds, and to better conceptions of mechanical execution.

General Hygienic Conditions, Favorable to Success in Plastic Surgery.

In the surgery of emergencies, patients are taken as they happen to be; in good condition or bad, with healthy or unhealthy surroundings; but in the ordinary performance of plastic operations, not done immediately after the receipt of injuries, the surgeon has it in his power to secure for his patients, the hygienic and therapeutic agencies which are most favorable to union of incised surfaces.

The ordinary statement is, that the conditions of the best general health are the conditions of the best success in operative surgery; but the correctness of this statement may be called in question. It has been long admitted, that a patient who has, for a considerable time, been confined to bed, is more likely to have his wounds heal by the first intention, than one who meets with an accident in the midst of activity; as if the unnatural condition resulting from the quietude of confinement, were more favorable to success than the natural condition of activity. After suddenly enforced confinement, the muscles exhibit a condition of wearisomeness which excites a state of fever, unless this irritability is counteracted by artificial means, such as opium to blunt the sensibility, and cathartics to keep the waste material from accumulating in the blood.

Abernethy, in his work on the Constitutional Origin of Local Diseases, relates it as a discovery, that he found that patients who had been some time in bed, underwent operations with better results, than those who had not been subjected to any such preliminary treatment, and hence, he adopted the rule of keeping patients in bed two or three days, who were about to undergo any important operation. It is not the condition of the greatest muscular strength, that is required as a desirable surgical element, but a state of the blood which does not readily permit a febrile condition. Hence, a training for a chirurgical operation should be quite different from a training for a pugilistic operation.

The preparatory diet should be as moderate as the exercise, but it is no more necessary to exclude the nitrogenous elements from the food, than it is to take the mattress from the bed and replace it by a board. As the comfort of the patient in his quietude may be secured, so his comfort in his diet requires that all the elements of nutrition should continue to be furnished, but only in such diminished quantity, as the diminished muscular exercise would naturally suggest, and in such digestible forms as to become easily and perfectly assimilated. So, also, an empty state of the bowels, without extreme purgation, secured before resort to an operation in which it is important to avoid subsequent fever, is of great importance, in order that after the operation, the patient need not be disturbed by the effects of a cathartic. The necessity for a bracing atmosphere, free from miasm, suggests that the more important plastic operations should not be done in hot weather.

Some other medicinal agents, acting as preventives of mischief, are properly hygienic, such as a course of a few days' administration of *bark and iron*, not simply to remove any suspected malarious condition, but to secure a mild erethism of the nervous system, and an aptitude of the blood for plastic exudations, resulting in the reproduction of tissue, not spongy, like overgrown granulations, known as "proud flesh," but firm and readily covering itself with cicatricial skin. In this condition

of the system, the adjoining parts readily wall themselves in, against the imbibition of fluids in a state of decomposition.

We have, thus, the conditions most favorable for exemption from erysipelas upon the skin, diffuse inflammation in the soft textures beneath, osteo-myelitis, or diffuse inflammation in the bones, and general pyæmia, or necræmia, from the absorption of sanious fluids.

The General Therapeutic Indications, are:—

1st. The prevention of nervous shock, from the suddenness or intensity of the impression.

2d. The prevention of nervous exhaustion from the long-continued pain and constraint during an operation.

3d. The prevention of those disturbances of the circulation, and consequent congestions and inflammations, which arise from local impressions, directly, or through reflex action.

For the first indication, the beneficial effects of anæsthetics, in operations and injuries involving much pain, are incalculable. It cannot be claimed that the condition of the nervous system in which sensation and movement are suppressed, entirely exempts the system from that sudden depression known as shock, and it may be that some of the deaths which have occurred during the employment of chloroform, would all the more certainly, have occurred without it. It is a curious circumstance, that the first patient who was to take chloroform did not take it, but nevertheless died, unaccountably, during the operation. Dr. Sampson was to administer chloroform to a hospital patient, for the first time to a human subject, but, being behind the time of his appointment, the operation went on, and the patient died, before its completion, from shock; from an influence upon the heart analogous to what is produced by the introduction of cold water into the stomach in a heated condition of the system, or a blow upon the epigastrium.

It is claimed by some, that anæsthetics have an effect to diminish the plasticity of exudations, and that they are therefore unfavorable to union by the first intention; but it is believed that there is an entire want of evidence of this effect.

Dr. Frank H. Hamilton thinks he has seen evidence of this effect of anæsthetics to diminish the adhesive tendency, in the surgery of the army, and it is true, that in the conditions of the system and its surroundings, in the life of a soldier, adhesion is less likely to occur, than under the circumstances of careful preparation and subsequent therapeutics, practicable in civil surgery; and, besides, the majority of the observers have failed to see this deleterious influence, even in the army.

The second and third indications are met by the same agents, among which are also alcoholic stimulants, given with the view of rendering the nervous system less amenable to disturbing influences, and opium is properly employed as a more efficient agent to the same end.

For the immediate removal of exhaustion, alcohol is doubtless the most efficient agent, given in small quantities, with reference to its stimulant power, and as an accompaniment to nourishment; but the temptation to overdo, in this direction, must be carefully guarded against.

For the third indication, there is nothing equal to opium, and the writer is accustomed to give it in connexion with all important operations, with reference to its power of annulling the influence of local impressions, and *preventing* inflammation, both at the seat of injury and in distant parts, through reflex action.

A good type of this reflex action, is the production of a congestion in the nares and fauces by a current of cool air blowing upon some limited part of the body. Opium is known to annul this influence, and so does alcohol. This may be the reason why drunkards so seldom take cold, or acquire inflammations, in the terrible exposures to which they are subjected in their sprees. Opium is therefore given to prevent mischief, as well as to remove it. A slight degree of narcotism renders the confinement more easily endured; days, which would be long and anxious, are rendered, by opium, short and indifferent.

It is not recommended to continue this treatment longer than the duration of the causes of irritation, the effects of which,

opium is intended to forestall or to overcome. Whether this is to be for a few hours or for a few days, must be decided in each case for itself. The idiosyncraeies will be found fewer than is generally supposed, and when they do exist, or are imagined, a full nareotic dose will generally be better borne, than one which excites without quieting.

If, at the end of from twenty-four to forty-eight hours, it is found that adhesion fails and symptomatic fever rises, the treatment must be ehanged for one that is antiseptic and antiphlogistic. In this event, the substitution of veratrum viride for blood-letting, is a great improvement in therapeutics, diminishing the frequency of the heart's eontractions at the same time that the walls of the bloodvessels eontract with inereased force upon the blood which they contain; thus contrasting with the influence of bleeding which increases the frequency of the heart's action, and diminishes the tone of the vessels. By this, it is not implied, that blood-letting must not be employed, for emergencies in which the slower action of veratrum viride cannot be waited for.

In order to sustain the system during the period of recovery, and, at the same time, foster an appetite, so that food may be taken, iron or quinia, or both, are of great value. Citrate of iron and quinia, 5 grains, three times a-day; or tineture of chloride of iron, 20 drops, three times a-day, and 2 grains of sulphate of quinia, exhibited with the same frequeney, either separately or in eombination, fulfil indieations which have not been appreeiated until within the last few years, and not, indeed, until the grand seale of the recent war furnished a field for observation and eomparison, adequate to settle rapidly the eomparative merits of different procedures. These are among the best preventives and curatives of purulent infection, when timely administered, that is, when they are given in anticipation of the symptoms they are intended to control; when given at a later period, they diminish the number of cases, in which it may become necessary to control the circulation by blood-letting, or by veratrum viride. They do this, by diminishing the susceptibility to depressions and reactions, and by favoring the forma-

tion of *laudable* pus which covers granulations, shielding them from the contact of fluids, the absorption of which would be poisonous. If, however, a high arterial excitement occurs, it must be suppressed, and the general substitution of veratrum viride for bleeding is a recognition of its superiority. It holds the heart in check without wasting the materials of nutrition, but the extreme fear of bleeding, felt by many at the present time, is shown to be unfounded, from the fact that patients generally recover after considerable losses of blood from the uterus, the nose, or from wounds which are not themselves so extensive, as to involve exhausting discharges in the processes of repair.

Care must be exercised, not to keep the heart extremely depressed too long, for no nourishment can be taken while the system is in the state of extreme artificial depression produced by veratrum viride. A more moderate degree of depression, however, is capable of being prolonged a considerable time without suspending the appetite. In this respect, veratrum viride has a great superiority over tartar emetic, which depresses the heart less and nauseates more.

For the actual existence of pyæmia, the antiseptic influence of the sulphites and hyposulphites is sustained by very convincing experiments, but the writer has not had experience enough with them to speak with confidence. The use of alcohol in necræmic prostration, and especially in those cases in which there is a relish for it in some of its forms, is of undoubted benefit.

The local therapeutics necessary to prevent or to remedy disaster, are no less important. It is the aim, in all plastic operations, to secure to the greatest possible extent, the adhesion of the incised surfaces which are placed in contact. To this end, it is necessary that blood clots and foreign substances should be, as far as possible, removed. A small amount of blood, however, may be organized or absorbed, if the cutaneous surfaces unite without suppuration, so as to secure to the wound beneath, the conditions of a subcutaneous incision.

The temporary compression of arteries leading to the wounded surfaces, during and immediately following an operation, not

only lessens the amount of blood lost, but favors the contraction of the divided extremities of the small vessels. The facial artery may be compressed upon the inferior maxilla, and the coronary arteries may be held between the thumb and forefinger. These are, however, in the way of operative proceedings, and in order to compress these vessels while an operation upon the lips is in progress, a little instrument has been devised, which is illustrated in the accompanying figure.

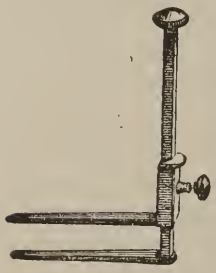


Fig. 1. Compressor for the coronary arteries of the lips.

The application of cold, yet so as not to freeze the flesh, aids the speedy arrest of hæmorrhage, thus hastening the period in which plastic lymph is produced, unmixed with blood. Dr. W. S. Edgar, Surgeon to the 32d Reg't. Illinois Infantry, states that, at Vicksburgh, it came to be the practice to place ice between the surfaces after amputations, for a short time before the final closure, with the result of a much more frequent union by the first intention.

A much more convenient method, is the spray of ether blown upon the different parts of the cut surfaces in succession, to aid the minute arterial openings to contract. Care should of course be taken, not to cool off thin flaps to too great a degree, lest the circulation should be so depressed as to result in gangrene. My first experiment with this was in the dissection of a toe, in search of a piece of broken needle. The ether spray was applied for the purpose of deadening the sensibility, and without any thought of favoring union by the first intention. To my surprise, the parts united without showing one drop of pus. Since then, I have uniformly employed the spray of ether upon cut surfaces, and with great satisfaction. The period of waiting for oozing to cease is very much abbreviated, and no effect unfavorable to organization is produced by ether upon the surfaces. It is plain, that nothing should be applied upon a wounded surface which coagulates the albuminous fluids. The application of the salts of zinc does this, and the treatment is, therefore, of questionable propriety. If the coagula are not

well washed away, they must serve as foreign substances, adverse to union.

It is not only important that there should be no putrefying fluids in a wound, but that there should be no dead flesh there. To this end, where adhesion is hoped for, ligatures should be made to embrace a considerable amount of substance around the smaller arteries, in order that they may be drawn tightly enough to close the bleeding orifices, and yet not so tightly as completely to strangulate the parts embraced, producing a slough of dead flesh.

It was, in a great part, to obviate the dangers of the confinement of putrid fluids, that CHASSAIGNAC introduced his rubber drainage tubes, in order that, while adhesion is attempted throughout most of the surface of the wound, a free drain may be established from the interior. If, however, the wound can be so managed, that nothing may be left in it that is certain to putrefy, a small amount of effusion may be absorbed, as in subcutaneous wounds. It is as an aid to this end, that the method of acupressure introduced by Sir J. Y. SIMPSON, of Edinburgh, in 1859, presents its strongest claims. The theory is, that as metal absorbs nothing, it can give out nothing to poison the tissues.

Dr. SIMPSON, in his work on Acupressure,* states that in his experiments to determine the comparative tolerance of the tissues for metallic and for organic suture threads and ligatures, he found that threads of iron and of silver, and of silk and hemp, were exempt from irritation to nearly the same degree for the first two or three days after their insertion. After that time had elapsed, however, there arose around the tracks of the organic threads, more or less inflammation and suppuration, whilst the metallic threads did not excite such irritation by their presence. He took a suture thread, full of putrid pus

* *Acupressure*, a New Method of Arresting Surgical Hæmorrhage, and of Accelerating the Healing of Wounds. By JAMES Y. SIMPSON, M.D., F.R.S.E., Professor of Medicine and Midwifery in the University of Edinburgh, and Physician-Accoucheur to the Queen for Scotland, etc., etc. With Illustrations. Edinburgh: Adam & Charles Black. 1864.

from a wound, and inserted it into the bottom of a new-made wound upon the back of an animal, and into the bottom of a similar wound upon the other side of the same animal, he at the same time, put a fresh suture thread. A furunculoid inflammation rapidly sprang up in the wound containing the putrid suture, while the other wound did not exhibit the same speedy and unhealthy morbid reaction. He came to the conclusion, from these experiments, that a silken suture thread is nearly as good as one of metal, in cases where it can safely be removed within sixty hours after its insertion. The advantage of the metallic thread is, that while it is unirritating for the short period, it is innocuous for the long period also. It should be added, however, as a commentary upon this, that the sealing up of the tissues around a wound during the first three days, renders it more tolerant of putrid fluids than a fresh wound. In this way, we account for the general exemption of wounds from furunculoid inflammation, when the sutures have been introduced fresh instead of being applied in a putrid condition.

In order to a clearer conception of this new method of suppressing hæmorrhage, Figures 2, 3, 4, 5, and 6 are introduced. A mere glance at the illustrations, will afford a better conception, than pages of description.

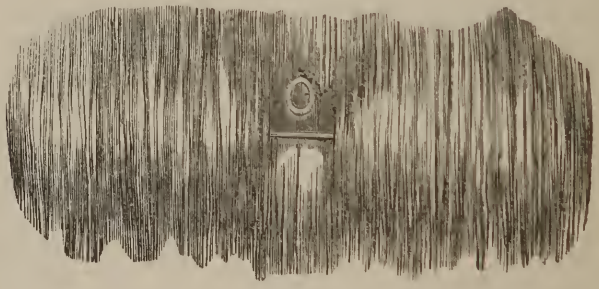


Fig. 2.

First method of acupressure. The raw surface of a flap, showing the bridge of the acupressure needle compressing the artery. The head and point of the needle are under or upon the cutaneous surface. Before attempting to withdraw the pin or needle, it should be rotated, to loosen its adhesions, by seizing its head with forceps and turning it backward and forward, until it is found to roll without resistance.

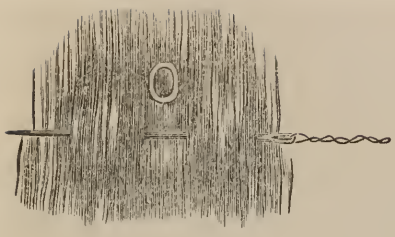


Fig. 3.

Fig. 3. Second method of acupressure, applied to an artery by means of a common sewing needle. The needle is introduced upon the raw surface, some distance from the vessel, then brought out over it, and then pushed on into the tissues. The emergence of the point of the needle, shown in the cut, may be omitted.

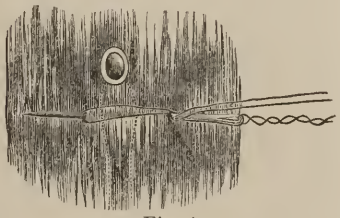


Fig. 4.

Fig. 4. Third method of acupressure, applicable to arteries of the largest size. The needle is passed in upon the raw surface, under the vessel and out again. A loop of wire is then slipped over the point of the needle, drawn across to its heel, and both ends of the loop are together twisted around the needle. This is done without the necessity for an assistant. The needle is steadied with the fingers of the left hand, while those of the right apply the loop and make the twist around the heel of the needle. The twisted wire with which the needle is threaded, is for the means of its withdrawal.

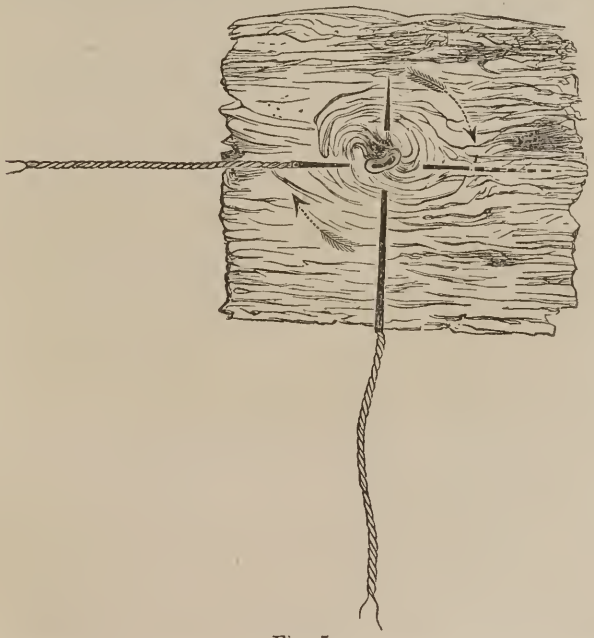


Fig. 5.

The needle is withdrawn before the wire surrounding it, after a period of from a few hours to a few days, rotating it and slipping it out from its inclosure in the wire, and the inclosing wire is withdrawn afterwards. If, by the corrosion of the metals, the needle refuses to slip out, both are subsequently withdrawn together, like an ordinary ligature ulcerating through the tissues. There is this difference, however, that the ordinary ligature loosens itself by the suppuration and absorption which it excites, while the wire and needle hug the tissues closely, and would remain forever, if not drawn upon, so as to cut out like a suture thread. For this purpose, it is convenient to attach a small rubber cord to the end of the wire attached to the needle, and fasten down the other end of the rubber cord by means of adhesive plaster. To obtain a perpendicular pull, the cord may be passed over a pulley, made by attaching a cork or spool to a frame extemporized from tin.

Fig. 5. Fourth method of acupressure, introduced by KNOWLES and figured in SIMPSON'S book. The needle is pushed through the vessel and surrounding tissues, the point emerging from the surface on the other side of the vessel. The heel of the needle is then carried around a-quarter or a-half circle, and pushed on into the tissues. The twisting of the small vessel closes its canal.

Fig. 6. Fifth method of acupressure, not figured in SIMPSON'S book. A needle is pushed through the vessel and surrounding tissues, as in Fig. 5, and instead of being twisted parallel with the surface of the wound, it is carried perpendicularly over to the surface of the wound upon the other side, and then pushed on into the tissues. The figure represents the needle raised up vertically and the depression commenced. When the depression is completed, the vessel becomes hidden in the fold made by turning one portion of the raw surface against the other, This method is only applicable to small arteries, and to veins, but it is a very convenient method for the cases which are suitable for it.

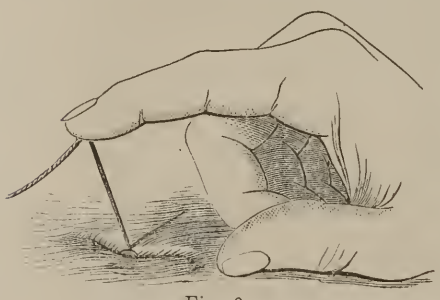


Fig. 6.

Dr. SIMPSON makes the following summary of the advantages of acupressure, which seem to me incontestable:—

"1st. It is more easy, simple, and expeditious in its application, than the ligature.

"2d. The needles, in acupressure, can scarcely be considered foreign bodies in the wound, and may always be entirely removed within two or three days, or as soon as the artery is considered closed; whilst ligatures are true foreign bodies, and

cannot be removed until they have ulcerated through the tied vessels.

"3d. The ligature invariably produces ulceration, suppuration, and, generally, gangrene at each arterial point where it is applied; whilst the closure of arterial tubes by acupressure, is not attended by any such severe consequences.

"4th. The chances, therefore, for the union of wounds by the first intention, should be greater under the arrestment of surgical hæmorrhage by acupressure, than by the ligature.

"5th. Pyæmia, and surgical fever, seem not unfrequently to be excited by the unhealthy suppuration, liable to be set up in wounds by the presence and irritation of ligatures.

"6th. These dangerous and fatal complications are less likely to be excited by the employment of acupressure, seeing the presence of a metallic needle, has not the tendency to create local suppurations and sloughs in the wound, such as occur in the seats of arterial ligatures.

"7th. Hence, under the use of acupressure, we are entitled to expect: *First*, that surgical wounds will heal more kindly and close more speedily; and, *Secondly*, that surgical operations will be less frequently attended by surgical fever and pyæmia."

The argument for the employment of metal, to retain the bloodvessels in contact, weighs with equal force, in the choice of means of holding together the surfaces of wounds.

Annealed silver and iron wire sutures, admit of equal facility of introduction, and are removed without difficulty, if care is taken, after cutting the wire, to straighten it out before drawing upon it. The twist or knot should generally be at one side or the other of the line of the incision. More room is thus secured for the choice of place, at which to cut the wire, prepartory to its removal.

The evil effects of suture threads, which penetrate mucous membrane, are lessened by the free communication with the exterior which the moisture upon the surface secures, while upon the skin, the dessication of the surface, seals in the remaining

fluid, allowing it to putrefy to a greater degree, and to exert some degree of pressure upon the surrounding tissues.

In the delicate skin of the eyelids, however, the orifices speedily acquire the condition of cicatrization, so that very little pus is formed, and that immediately dries, so that there is no irritation, unless the swelling of the tissues gives them the thickness, and the suppurating tendency of skin and subjacent tissue elsewhere.

While, therefore, the flexibility of thread of silk, linen, or cotton, affords a temptation to employ sutures of these materials upon these surfaces, the objections to them are, thus, at the same time lessened.

The plastic pin for the twisted suture, which has been for several hundred years a surgical favorite, affords a temptation to draw the threads too tightly over it, in consequence of which a line of integument sloughs or ulcerates.

The introduction of the pin is greatly facilitated by employing a grooved needle, an ordinary exploring needle, along the groove of which the pin readily glides.

Dr. A. C. Post, of New York, has described and figured, in the Transactions of the American Medical Association for 1866, an instrument with a groove for this purpose, but an ordinary exploring needle will answer every purpose.

It may, in many cases, be well to protect the skin by a layer of plaster, which distributes the pressure, and at the same time tends to keep the surfaces even with each other.

This is the Method.—Pierce a strip of plaster with the grooved needle, and then pass the needle through the tissues where it is intended that the pin shall remain. Then, withdrawing the grooved needle so that its point is nearly on a level with the surface of the skin, the plaster is drawn tightly over, and slit by the point of a bistoury opposite the point of the grooved needle, which is then to be pushed forward through the slit in the plaster. The slit should be just long enough so that the reinforcing thread to be applied over it, will not cause the plaster to fold up. The pin is then introduced along the groove, and the needle is withdrawn.

In some cases, the wound will require no other support than the plaster. In others, a thread can be passed over the needle in the ordinary mode of making a twisted suture.

The plaster distributes the pressure of the threads, so that ulceration is less likely to follow.

In the January number of the *American Journal of the Medical Sciences*, for 1860, (p. 81,) Dr. WASHINGTON L. ATLEE has figured and described a modification of the twisted suture, which consists in the employment of an elastic rubber ring in place of the ordinary fastening.

The theory of its use was, that its elasticity would enable it to yield to any swelling which might occur; but, unfortunately, it is found, in practice, that if the rubber is weak enough for this, it is too weak to retain the lips of the wound, and if it is strong enough for this, its pressure, without a point of cessation, may be injurious, while inelastic material ceases to press, the moment the resistance retires within the length of the material of the suture.

With regard to the cutting out of sutures, Dr. SIMPSON found, in his experiments upon animals, that if either kind, whether metalic or organic, happened to be overdrawn, so as to compress one side of its track too tightly, that side always ulcerated, as the result of its pressure.

An advantage of the metalic suture, of no little importance, is, that while it is necessary to remove sutures of linen, or silk, before it is fully safe to disturb the new-formed adhesions, the sutures of metal may be left as long as may be convenient, without fear of injury.

The number of the sutures, may also be greatly increased over the number which might be prudently introduced, where absorbing material is employed; and they may be introduced without fear, into the scalp, as it is the sanious pus, and not the suture, which excites erysipelatous inflammation.

Were Jobert now living and writing, we should read no such paragraph as this:—

"We have many times had the unhappiness to see our operations fail, just because we had made the points of suture too numerous."

With the employment of metalic sutures, the rule comes to be this: *Be sure and have enough of them, for they produce no irritation, and they impede the circulation less than plasters.*

As between the claims of iron and silver for sutures, it may be said, that both are equally free from any irritating quality, but iron roughens a little by oxidation, and is, therefore, not so easily withdrawn. The cost is greatly in favor of iron, and so is strength, where that is a point of excellence.

The medical profession owe a lasting debt of gratitude to Dr. J. Marion Sims, for his agency in enforcing the advantages of metalic sutures.

Applications upon the Surfaces.— Following these methods of avoiding putridity within the wound, it is all important to avoid it upon the surface. To avoid putrefaction, by irrigating with water, is generally impossible, and besides, the constant moisture of the surface, is unfavorable to exclusion of the air from the edges of the wound which is effected by the agglutination of the tissues, and equally unfavorable to the desired immobility of the parts upon each other. No kind of plaster will adhere persistently, under a deluge of water, and the water itself becomes a source of irritation, probably by its difference of density from that of the blood, and of the exudation from it. The water, by its law of osmosis, attracting a greater amount of exudation than the necessities of adhesion or granulation require.

Prof. Weber, of Halle, thinks that water is by no means an indifferent agent, and that for open wounds, milk, resinous and vegetable extracts, and a solution of common salt in water, agree much better.*

Dr. Esmarch, is emphatic, as to the therapeutic difference between dry cold, and cold combined with moisture, claiming that the moisture is often a source of hurtful irritation, which is entirely avoided by confining the ice, or cold water, in waterproof enclosures.

Soft rubber is the material which he prefers, and some

* Americal Journal Medical Sciences, April, 1865, p. 512, from British Medical Journal, Nov. 5, 1864.

absorbing fabric should always be placed between this and the surface of the body, to absorb the moisture which condenses from the atmosphere.*

A very neat method of applying dry cold, has been suggested by Dr. J. L. PRENTISS, in the Transactions of the Kansas Medical Society. It consists in the employment of a small rubber tube about eight feet long, the central part of which is coiled up like a serpent, and retained in position by tape tied around the coils. One end has a weight attached to it, and falls over the edge of a bucket containing ice water, while the other end, terminates in a tub receiving the waste water on a lower level. The speed of the current, and consequently the degree of the cold can be regulated by a stop-cock in the lower end of the tube.†

We have here a reason why a poultice is generally so much more agreeable to a wound than a fomentation or an irrigation.

An anteseptic poultice, however, furnishes too much moisture for purposes of union by first intention, though for suppurating purposes it is invaluable.

The fermentation of starch in a yeast poultice, in which sugar is first formed, and then converted into alcohol and carbonic acid, and the production of lactic acid in the souring of milk, where this is an ingredient, afford influences opposed to putrefaction. It appears, from some observations in some of the Philadelphia military hospitals during the latter part of the war, by Dr. JOHN H. PACKARD, Dr. FREDERICH P. PFEIFFER, and Dr. W. F. ATLEE, that sugar and sour milk were effective in arresting the destructive ravages of hospital gangrene.

We have here, an approach to an explanation of the popularity of the bread and milk poultice, which is found, by experience, to be superior to the poultice of bread and water, and still more superior to the simple fomentation, in those cases in which the elements of putrefaction exist.‡

* Dry Cold in Surgery, by Fr. Esmarch, New Sydenham Soc. Publications. London, 1861.

† *Philadelphia Medical and Surgical Reporter*, Aug. 24, 1867, p. 167.

‡ See *American Journal of the Medical Sciences*, January, 1865, p. 118, April, 1865, p. 376, and July, 1865, p. 61.

A solution of permanganate of potash, of about a drahm to a pint of water, affords an excellent antiseptic, especially when irrigation is proper, but there is a great objection to it in the ineradicable stain which it communicates to every article of clothing which it touches.

This objectionable property of permanganate of potash, led the writer to experiment with chloride of zinc. This led to a discovery which is truly important. It has been found that a mixture, of one fluid ounce each, of glycerine and water, with four grains of chloride of zinc, constitutes, not only an excellent antiseptic application, but that it coagulates the albuminous exudations upon the surface, producing the very conditions so desirable for union by adhesion, and at the same time causing isinglass plaster to continue to adhere with firmness, while it remains flexible, instead of drying, curling up, and falling off, as it is wont to do.

After the dressing of the wound has been completed, the mixture is applied freely over all the plasters, by means of a camel hair pencil, and repeated every day. The chloride of zinc solidifies the exudations, and the glycerine prevents the plaster from peeling by the contact of moisture while it is antiseptic, as will be seen by the following series of experiments. The application of a considerable quantity of warm water, however, as is done in the intentional clearing of the surface of its investments, so dilutes the glycerine that its retentive properties are lost, and the plaster is readily peeled up.

In order to test the antiseptic properties of this combination, an experiment was made by filling watch glasses about half full of the constituents of blood, and adding water from time to time to supply the waste by evaporation.

May 28, 1867.

1. Into one watch glass, crassamentum alone was placed.
2. Into another, serum alone.
3. Into a third, crassamentum, with glycerine and water, equal parts, with chloride of zinc, 13 grains, to the f. ounce—a white coagulum of the serum adhering to the crassamentum immediately appeared.

4. Into a fourth, serum was plaeed with the same mixture —a white coagulum was immediately formed.

5. Into a fifth glass, erassamentum was plaeed, with the same eombination of glyeerine and water, with ehloride of zine, only 4 grains to the f. ounce.

6. Into a sixth glass, serum with the same combination of glyeerine and ehloride of zinc. The same appearanees were observed as in the 3d and 4th experiments.

7 and 8. Crassamentum and serum were plaeed, respectively, in wateh-glasses, and glyeerine alone added, in about equal quantity with the blood-eonstituents. No appearanee of eoagulation.

These were examined from time to time, and water added to supply the loss by evaporation. The eombination of serum and glyeerine remained fluid, without any coagulation whatever. All the other mixtures beeame solid or semi-solid, the water having dried out by the third day of the experiment. Eaeh time after the glasses were replenished with water the process of drying took plaee with surprising rapidity. The glasses were laid on a shelf of a bookease, and the replenishing with water was not very faithfully done, so that the experiment does not determine how soon putrefaetion would have oecurred if the substanees had been kept constantly moist.

July 6th. Soon after a refilling of the glasses with water, the crassamentum and the serum, which were unmixed with the antiseptie, exhibited a very putrid odor, while all the rest remained odorless. It seems that the strength of 4 grains of chloride of zinc to the ounee is sufficient for its eoagulating and antiseptic properties, without being strong enough to irritate the tissues.

A series of experiments, employing laudable pus for the objeet, was commeneed a few days after that with blood, with the same results. The simple pus exposed to the air beeame rapidly putrid and had to be thrown away, while that combined with glyeerine, remained semi-solid, and the mixture with glycerine and chloride of zine (4 grains to the ounee, as before,) coagulated. Both have resisted putrefaetion. It is doubtful

whether any combination will soon be found, of equal value in plastic surgery.

At the time of closing this report, Sept. 28th, 1867, there is no sign of putrefaction in any of the mixtures. The blood has been kept four months through the hot season, and the pus two months, and they would probably keep for years without putrefaction.

Temperature and *Posture* are important considerations, but, fortunately, the rule of comfort, or what would be comfort if parts destitute of sensibility had feeling, is nearly the universal rule. It is important to explain this to patients, because recent popular inculcations have fostered a false impression, that the colder injured parts can be kept, the better. A dependent posture endangers the venous congestion of a flap, while one elevated may too much retard the arterial supply. Generally, then, the horizontal posture is the rule.

We never hear, now-a-days, of reducing the amount of blood in a flap by bleeding, and the following advice, to resort to local bleeding from a flap, appears very remarkable. Velpeau, in speaking of his own method of rhinoplasty, says that, "if, on the third day after," (the operation,) "or on the following days, the new nose should appear swollen or livid, it may be advisable to use some bird-peck punctures to it, or to cover it with leeches."* If the bird-pecks or the leech-bites escape diffuse inflammation, erysipelas, and gangrene, there may be said to be good luck.

It is easy to state some of the principal local conditions of success, in attempting to secure union between a flap, and a surface to which it is applied.

Among the most important of these, is activity of nutrition in both parts, either by a vascular supply, as in ordinary tissues, or by a rapid change of fluids and speedy production of plastic lymph, as in the cornea.

It is useless to attempt to make a flap grow fast to a cicatrix, and any considerable amount of cicatrix in a flap, will make mortification of it certain.

* Velpeau's Surgery, Mott's edition, vol. i., p. 621.

The entrance of arteries with some degree of directness into a flap, insures a vigor of circulation, productive of an abundant supply of plastic lymph, and on this account, plans of operating should be adopted, which will secure to the flap, the best circulation practicable. If the pedicle, or undetached portion of the flap, is in the direction of the natural vascular supply, it is evident, that the chances for preserving the vitality are greater, than when the principal supply is cut off in the operation, and new sources have to be drawn upon, while the detached part is suffering from the shock of separation.

To illustrate: In the formation of a nose, by integument taken from the forehead and twisted around and brought down, it is of very great importance to avoid cutting the branches of the supra-orbital artery, or, at any rate, to leave the supply unimpaired upon one side.

In opposition to this advice, the celebrated DIEFFENBACH advised to divide any large arterial branch going into a pedicle, through fear, that the returning veins might not be able to carry away the blood brought in by the artery. This fear probably arose, from failing to appreciate the necessity for a free arterial supply for the production of organizable lymph, having been misled, by experience of the aggravating influence of an equal supply, in feeding an inflammation, where adhesion has failed. Even in the latter case, there is generally more fear of mortification of the flap from insufficient arterial supply, than from too much of it.

Another of the conditions important to success, is that the implanted material, may lie in its new position without great distension or compression. Both these conditions interfere with the free circulation necessary for the nutrition of the flap, as well as the production of the reparative exudation to unite adjoining surfaces. A moderate degree of compression, may serve to bring the surfaces into better contact, and if it is no more than is necessary to this end, it is, therefore, useful; but if perfect contact can be secured without compression, the danger here indicated, is diminished. Those plans are equally faulty, which require any considerable degree of distension of the flap.

Classification.

A philosophical classification, will greatly aid in the appreciation and application of the principles resulting from the analysis of the different expedients of plastic surgery. The processes may be reduced to the following six general methods, with their varieties, *viz.*:—

I. Sliding in a direct line.
   1. As in approximating a wound without under-cutting.
   2. By cutting under the edges.
   3. By parallel incisions.
   4. By transverse incisions. (French method.)
   5. By the slow process of granulation and cicatrization.

II. Sliding in a curved line.
   1. The flap having curved borders.
   2. The flap having angular borders.

III. Jumping. (Indian method.)
   1. Without a twist of the pedicle.
   2. With a twist of the pedicle.

IV. Inversion or eversion.
   1. Resulting in plane surfaces.
   2. Tubulation.

V. Taliacotian—the part being obtained from a distance.

VI. Grafting.

Jobert makes a classification in five methods, thus:—

1. Indian, or by torsion.
2. Italian, or by transplantation.
3. French, or by displacement.
4. Jobert's, or by gliding.
5. Jobert's, or by reversion.

Blandin (*Autoplastie, 1836,*) mentions autoplasty by rolling the skin, and by successive migrations of the skin, by redoubling of a part, by elevating a part, by primitive union and secondary section of a pedicle, and by lacerating the skin. The imperfect nature of these classifications will be seen at a glance.

According to Velpeau, anaplasty by *restitution*, is the replacing of parts in their original relations. Anaplasty by *transpo-*

sition, is the supplying of a deficiency by parts brought a greater or less distance.*

Classification, with Explanation of the Varieties.

I. (1.) Sliding in a direct line without under-cutting the lips of the wound, as in uniting an ordinary incision. The incisions made of an elliptical shape, for the removal of some minute tumors from yielding tissues, may be closed in this way, and fistulous orifices of small size in the checks, and in the vagina, admit of this method.

The first variety of this method, is applied to the removal of deformities resulting from the adhesion of cicatrices to bone, by which a gutter is formed; and to the removal of circular grooves around the extremities, probably resulting from the formation of bands in the amniotic fluid, which, when the constriction is sufficiently tight, result in amputation. The skin within the gutter is to be dissected out, and the lips of the resulting wound brought together, and retained in apposition by sutures and plasters, as in cases of simple incisions. When the groove has considerable width, some degree of cutting under may be necessary, carrying the mode of operating into the next variety.

(2.) The cutting under of the lips of the wound.

The most simple method of covering parts deprived of integument, is to cut under the adjoining skin on each side, and stretch it over. This is the method ordinarily pursued after the removal of small tumors. The tumor or portion to be removed, is cut in the form of an ellipse, and after the removal of the part, the knife is carried under the integument to sever its connexion with the tissues beneath, so that it may be released to its natural extensibility, and be easily stretched over, till the incised edges meet. This expedient, like many other things, is attributed, by JOBERT, to CELSUS. It is simply the conversion of an excavation into the condition of an ordinary incision, so that, upon its closure, only a single line of union appears.

(3.) The cutting of parallel lines at some distance, to enable the deficiency to be more readily covered.

* Velpeau's Surgery, American edition, Vol. i., p. 616.

The spaces made by the gaping of the secondary incisions, heal by granulating.

The accompanying diagrams illustrates this variety.

The ellipse is supposed to enclose a wound or fistula, to be closed by an operation. In order to increase the facility of bringing the edges together, parallel incisions are made thus:

Before Closure. After Closure.

When the opening is closed, the elliptical lines become parallel, and the parallel lines become correspondingly curved, leaving two semi-ellipses destitute of integument.

More or less cutting under, may be practised in connexion with the resort to parallel incisions.

In operations upon the cheek, this incision may be made in the mucous membrane, and not in the skin, in order to avoid the scar which must result from the cicatrization of the cutaneous integument.

(4.) *Cutting under*, as above, and making incisions at right angles from the extremities of the wound, in order to permit the flap to be distended very much beyond its original extent.

This variety will be more readily comprehended by, these two diagrams:

The ellipse represents a wound or orifice to be closed. To increase the advantages of cutting under, transverse incisions are made upon one side, (or both), going in the direction in which

the skin will yield most readily. The flap is then stretched over the opening, so that the lines of incision come to present the appearance shown in the second diagram. The curved line on one side, has become straight by cutting under, and that on the other side, by cutting under and by transverse incisions, which will generally be parallel to each other.

The method is also illustrated in Fig. 7.

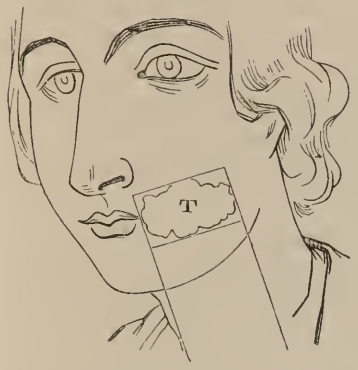


Fig. 7.

First method, fourth variety. A diseased patch in the cheek is cut out by rectilinear incisions, two of which are continued down the neck. The flap is cut under and stretched up to cover the vacant place.—[*From Serre.*

The term, "The French method," is applied emphatically to this variety of direct gliding, and is greatly lauded by SERRE, of Montpelier, who has written a work chiefly to inculcate it.*

Direct gliding has also another claim to the name French, inasmuch, as a Frenchman by the name of FRANCO, wrote a long time ago in its favor.†

When this variety of direct sliding is applied to parts which will not resist retraction, as the lips and eyelids, it is especially faulty; for the unavoidable shrinking of the distended tissues, is almost certain to result in eversion.

(5.) *By granulation and cicatrization.* The moulding influence of cicatrization, whether unavoidably occurring, or purposely secured, is a power in plastic surgery, which sometimes produces horrid results when in a wrong direction, but in the right direction, admirable. This element enters, necessarily, into a large portion of plastic operations, in which the most important ends are to be obtained by adhesion, while subsidary ends are secured by this slow process of closing wounds, and approximating dist-

* Traite sur l'Art de Restaurer les Difformetes de la Face. Montpelier: 1842.

† Velpeau's Surgery. Mott's ed., Vol. i., p. 606.

ant parts. It is here, that the contracting tendency of cicatrical material is made to be an obedient servant, instead of a resistless master.

The following case is an illustration of this power of repair:

Case I.—A very remarkable case of *autoplasty*, without the use of a knife.

S., about 21 years of age, having on strong corduroy overhalls over his pants, was caught (August 25, 1858,) by the pin in the horizontal tumbling shaft, connecting the horse power with a threshing machine, which drew him down upon the revolving shaft, winding the penis and scrotum in the garment, and tearing off the portion of integument covered with hair, the scrotum, one testicle, and the skin of the penis, up to the glans.

What remained of his private parts, were a skinned penis and a skinned testicle and spermatic cord, with its covering of cremarter muscle, with a liberal base of skinned pubes and perineum.

The wound was kept dressed with slippery elm poultices, the bowels kept open and sufficient opium given to quiet irritation for three weeks, when quinia was given to counteract symptoms of ague. Some whisky, in small portions, was also given during the continuance of the intermittent symptoms.

The patient recovered with the power of erecting the penis, and the testicle became well covered with natural skin. The integument of the penis was cicatricial. Nothing but frequent erections, could have averted the catastrophe of a binding of the penis to the pubes by the contraction of the cicatrix.

The patient, finding that the function of the part had not been destroyed, got married, but no issue has crowned the wedlock.

The surgery, in this case, consisted in the *conservative* care of the case, affording to nature in her efforts, the artificial conditions most favorable to success.

II. *Sliding in a curved line.*—(1.) Sliding in a curved line, of a flap of a more or less curvalinear shape, with under-cutting of the adjoining integument, so as to cover the space from

which the flap is taken. Figs. 8 and 9, from ERICHSEN, representing the repair of a retraction of the lower lid, show this method very perfectly.

Fig. 8.
Second method, first variety, plan of the operation.—[*From Erichsen.*

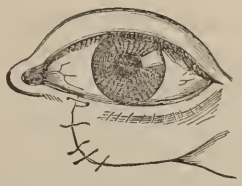


Fig. 9.
Second method, first variety, operation completed.—[*From Erichsen.*

The first variety of this method is capable of a great range of application, and is a much neater expedient than that of the trapezoid flap of the next variety.

Dr. EDMUND ANDREWS has given, in the Transactions Illinois State Medical Society, for 1866, numerous figures, with extended descriptions, illustrating and amplifying this variety of the second method.

(2.) Sliding of an angular flap, in which it is generally impracticable to cover the space from which it had been taken, and which is, therefore, left to cicatrize over by the process of granulation.

Fig. 10.
Second method, second variety.—[*From Serre.*
a Space left vacant by the removal of the flap.
b The flap in its new position retained by sutures.

In CHOPART'S method for cheiloplasty and blepharoplasty, the second variety of curved sliding is employed.

The cicatrices are dissected out, and a trapezium is made on one side of this space, with its free end toward the lid, or the lip, as the case may be, and the flap is made to glide into the new position, leaving the place from which the flap had been taken, an open wound.

This is on the authority of VELPEAU, but as an illustration of the uncertainty of titles to such preëmptions, it may be stated, that the trapezoid flap to be moved in the

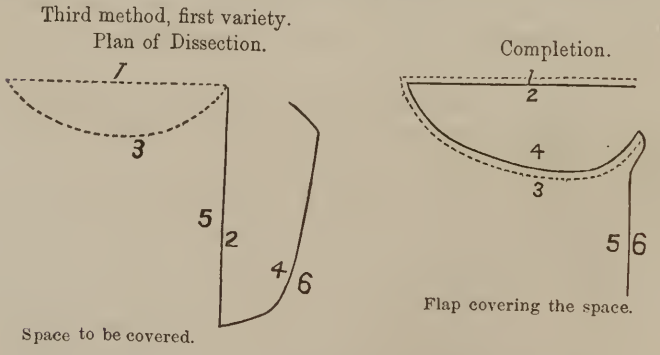
segment of a circle is ascribed by PANCOAST to DIEFFENBACH and VON AMMON.*†

III. *Jumping.*—The third method, is characterized by the free end of a flap jumping over a portion of undisturbed integument, while its circulation is maintained through its pedicle or attached end.

This is called the Indian method, as it was the plan early practised in Eastern Asia, in transplanting integument from the forehead, to repair the loss of the nose, frequently inflicted as a penalty. This method, as applied to the nose, was introduced into Europe in 1814, by CUSPIN, and immediately adopted by GRÆFFE and DIEFFENBACH.

This method has two varieties—1. Without twisting the pedicle. 2. With twisting the pedicle.

The accompanying diagrams illustrate the principle of the first variety of the third method. When the flap is moved no more than a quarter of a circle, it is not necessary to twist the pedicle. Some cutting under is necessary to the complete adaptation of the parts to their new relations. The numerals in the diagrams will show the changed relations of the lines.



This is one of the most important methods, and, in a large proportion of the cases, is the only one practicable. Fig. 18, illustrating the restoration of the upper lid, shows the first

* Operatic Surgery, by Joseph Pancoast, M.D., plate 73, figs. 5, 6, 7, and 8.

† Die Plastiche Chirurgie, von Dr. Friedrich August von Ammon und Dr. Moritz Baumgarten. Berlin: 1842.

variety, and Figs. 11 and 12, from ZEIS, showing the improper application of the method in the reconstruction of a lower lip, illustrate the second variety.

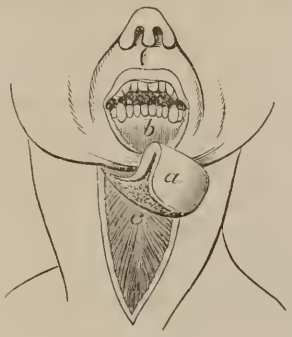


Fig. 11.

Third method, second variety, applied to the lower lip.—[*From Zeis.**

b Space left after the removal of a cancer.

a Flap taken from the neck.

c Space left vacant.

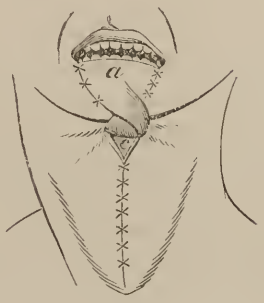


Fig. 12.

The completion of the operation.—[*From Zeis.*

a Occupies the position of *b* in Fig. 11, and the space *c* is in great part covered by cutting under and drawing together, *i.e.*, by the second variety of the first method.

As an illustration of the degree to which particular methods are employed as hobbies, Dr. MOTT, of New York, had achieved some brilliant success in cheek-mending, as early as 1825, employing flaps with which to cover the deficiency; but fifteen years later, TOWNSEND, the translator of VELPEAU, considered this method entirely superseded by the French method of gliding.

Now, again, flaps are in greater favor.

After the cutting away of the pedicle, subsequently to the union of the flap in its new position, in the second variety of the third method, and after grafting, (method vi), the circulation and innervation are carried on entirely through the adventitious connecting medium.

* Hand-buch der plastischen Chirurgie, von Eduard Zeis, Doctor der Medicine und Chirurgie, U. S. W. Berlin: 1838.

The condition and capabilities of the flap, thus isolated, was at one time very carefully studied by JOBERT.*

The circulation is found to be less active than that of the surrounding parts, and HOLMES COOTE relates an instance (in Holmes' surgery) in which a new-made nose, which he was quite proud of, shriveled away to insignificance.

With regard to innervation, JOBERT found, that in some cases, in which transplanted flaps exhibited no sensibility soon after the division of their pedicles, yet, several months later, they manifested sensibility to pricks and other modes of irritation. Yet, in a case in which he had the opportunity of dissection—the patient having died some years after the operation, no nerves could be traced into the flap. The branches could be traced up to the line of union, but not across it. JOBERT made experiments upon animals, with results like those of his observations upon man, *viz.*, sensation established after a while, but no nerves to be found traversing the cicatricial connexion, to account for it.

In the language of this author:

"Physiological observation shows that sensibility is reproduced in the flap, and anatomical observation fails to show that the continuity of the nerves is reëstablished."

He has an electric theory, for accounting for the communication of sensation. When parts are exactly restored to their original position, as when amputated fingers are replaced, it is evidently possible for the nerves to reunite without there remaining any intermediate substance, for whatever exudation may be necessary to secure union may ultimately be absorbed, leaving the nerve as it had been before the division.

The instances of the recovery of the function of nerves, after division, are too numerous to leave any doubt upon the subject.

With regard to susceptibility to disease, JOBERT has known all portions of the body to be successively covered with erysipelas except a transplanted flap, which had escaped. He has also known the pustules of variola to be of smaller size on a flap, than elsewhere.

* Cherurgie Plastique, Tome i., p. 96, etc.

IV. The inversion or eversion of surfaces (*dedoublement* of Roux.) This method has two varieties:

(1.) The inversion or eversion results in plain surfaces, skin being placed in the position of mucous membrane, or vice versa.

(2.) Skin or mucous membrane is doubled upon itself to form a tube, or a hollow space.

(1.) In the change of places of mucous membrane and skin, the surfaces, to a considerable extent, change their anatomical properties, as well as their functions.

Serre observes, that while the operation of Dieffenbach for enlarging the mouth, establishes the capability of mucous membrane of assuming the functions of skin, the experiments of Delpech, prove the opposite capability of the assumption of the character and functions of mucous membrane by skin when secluded from the dry air, and kept covered with moisture.*

M. Roux says, with regard to the change of places of skin and of mucous membrane, "I believe that a portion of skin, which has its epidermic surface maintained in a mucous cavity, becomes identical with mucous membrane.

"This disposition of the two grand tegumentary systems with which man is provided, the interior and the exterior, to take, each the character of the other, in accidental circumstances, is a fact well known in general anatomy."†

This method is employed in Dieffenbach's operation for enlarging the mouth, Figs. 37 and 38, and in the operation for entropium and symplepharon, illustrated in Figs. 24 and 25.

(2.) *Tubulation.*—The formation of a tube out of skin or mucous membrane, previously constituting plane surfaces.

This expedient has been adopted in the formation of a new urethra,‡ and in the narrowing of the capacity of the vagina for procidentia of the uterus.§

It is shown upon a magnificent scale, in the triumphant ex-

* Velpeau's Surgery, Mott's ed., Vol. i., p. 815.

† Quarante Années de Pratique Chirurgicale par Ph. J. Roux, Tome premier, Chirurgie Reparatrice, p. 33.

‡ See the operation by Teale, further on.

§ See pamphlet by Dr. Thomas Addis Emmett. New York: 1865.

ample of the employment of this method, in the formation of a bladder, in a case of congenital extrophy of this organ, by Dr. DANIEL AYRES, of Brooklyn, N.Y., illustrated in Fig. 50.

V. The Italian or Taliacotian method, in which the flap is taken from a distant part.

TALIACOTIUS dissected up the flap and interposed some material between it and its original seat; waiting a considerable time for thickening and healing by granulation before attaching the flap in its new situation, then, by means of complicated bandages, maintained the limb which supplied the flap in near relation to the portion of the face to be repaired.

The operation has been repeated by GRÆFFE, of Berlin, and by the late Dr. J. MASON WARREN, of Boston, in rhinoplasty. (See Figs. 15 and 16.)

A very satisfactory success of cheek-mending by this method by Dr. G. C. BLACKMAN, of Cincinnati, may be found in the *American Journal of the Medical Sciences*, for October, 1845, page 228.

There is an obvious advantage in this method of educating the integument to be transplanted, that it becomes habituated to receiving its entire vascular supply through its pedicle, besides, it shrinks as much as it ever will shrink, before it is applied in its new situation.

GRÆFFE is said by VELPEAU, to have followed the plan of TALIACOTIUS, in permitting a flap dissected from the arm to thicken and cicatrize, before attaching it to its new surroundings upon the face.*

The chief objection to this means of acquiring material for supplying integument for deficiencies of the face, is the comparative feebleness of the circulation in the skin of the arm, and the length of time required to augment the vascularity by dissecting up the flap and allowing it to remain for cicatrization, while some substance is all the time kept interposed between the flap and the arm.

VI. *Grafting.*—According to JOBERT, one of the methods

* Velpeau's New Operative Surgery, Vol. i., p. 605.

followed in India, is that in which a flap is entirely detached from one place, and is applied to another, as in vegetable grafting and budding.

A spot on the nates is selected, and subjected to repeated light contusions, in order to increase its vascularity, after which it is cut out, and attached to the previously denuded part, over the nose or elsewhere. The frequent failures of this process must prevent its being adopted, except in rare cases.

The success of the curious experiments of Hunter and others, in which the spurs of cocks have been made to grow upon their combs, and in which testicles have been made to attach themselves and maintain their vitality in the peritoneal cavity, are sufficient to settle the possibility of grafting, whatever doubts may attach to particular claims to success, by this method of plastic surgery.

The cases in which fingers and toes, entirely detached, grow again, when replaced in their old relations, with a restoration of their functions, should remove all doubt of the possibility of parts, completely detached, forming new attachments.

A man once came to me, saying that he had cut off two of his fingers, but that he had himself stuck them on again, but was afraid he had not done them up with sufficient security.

I accordingly applied isinglass plaster with great care, and put on delicate splints to keep them from getting displaced.

Some days afterward, he came to me with the ends of the fingers gangrenous. On removing the dressings, after soaking them in warm water, in order to separate the mortified fingers, I found that they would not separate, and that union was perfect. My blunder of over-careful bandaging, had caused the extremities of the fingers to mortify.

The application was sufficiently loose at first not to impede the circulation, but the subsequent swelling, occasioned the fatal constriction.

This case taught me never to apply plaster completely around a limb, large or small, very soon after an injury or operation.

Cicatrices.

One of the most frequent occasions for plastic operations, is the distortion of parts, from the contraction of cicatrices from burns and scalds.

The non-elastic cicatricial material, with which the injured integument is repaired, called by DELPECH *inodular tissue*, tends unceasingly to diminish in volume. Dr. MÜTTER, in PANCOAST'S "Operative Surgery," quotes a case related by Earle, in which the shoulders were approximated with such force, as to cause shortening of the clavicles by absorption, and the cases are more common, in which the anterior part of the lower jaw is bent downward by the pull of the cicatrix upon the chin, the counteracting masseter and the temporal muscles, acting upon the jaw as upon a lever of the second kind, and thus tending to curve the bone.

It is very difficult to prevent distortion, even upon the extremities, where there is every opportunity for the application of mechanism, and much more difficult where the eyelids, the lips, and the ears, are the parts which receive the traction of this relentless agent.

The attempt to remove or to prevent these distortions is an arduous undertaking, and it is curious to see how those who are discouraged with operations, advise mechanism, and those who see the futility of mechanism, advise operations.

No stranger language of discouragement can be employed than that of HOLMES COOTE (in Holmes' Surgery, Vol. III, p. 112):—"Let no surgeon, who hopes to remove a deformity, ever trust to the persistence of a large cicatrix; let him likewise remember, that every incision he makes, involves the formation of this newly effused and readily contracting uniting medium, and he may perhaps be more wary than has hitherto been the case, in attempting the removal of contractions by operation."

A little farther on, (p. 131,) after exhibiting a cut similar to Figs. 43 and 48, and speaking of the case, he follows the lead of LISTON, and says:—"Surgical ingenuity has been pushed to the utmost, to devise operations by which this distressing calam-

ity may be removed, but I express the experience of most surgeons of the present day in affirming, that hitherto, all such operations have proved failures, and for this simple season, that wherever an incision is made, a new cicatrix must be formed, and this new cicatrix will undergo precisely the same process of contraction as the former, which it was intended to alleviate."

"It may be laid down as a rule, *that a cicatrix should never be touched with a knife*, and we find that these operations have for some time past been discarded as useless at St. Bartholomew's and some other leading London hospitals."

This desperate language is confirmed, a little further along, by disparaging the process of detaching and transplanting flaps of integument, as practised by TEELE, (Figs. 46 and 47,) and by quoting Mr. SKEY, who doubts the practicability of securing the union of the displaced integument in the place of its new implantation.

In opposition to the view entertained by COOTE, that the new cicatrix resulting from the previous destruction of a cicatrix, will have the same unmanageable character, we find, that in some cases in which the extirpation of the cicatrix seemed impracticable, VELPEAU destroyed them with caustic potash, and he found the resulting cicatrix to be of a very different character from that of the burn.*

The case operated upon by Dr. MÜTTER, (Fig. 43,) and the case soon to be detailed, (Fig. 48,) show two things, notwithstanding the high authorities just quoted, *viz.*, that cicatrices may be cut with advantage, and that flaps may be successfully transplanted to take the place of cicatrices.

Step by step, sound skin may be made to travel in the direction of a cicatrix, until it occupies the position of the cicatrix removed, and performs the functions of the integument originally occupying the position.

Three points must be insisted upon in these transplantations:

1. There must not be cicatricial tissue on the base of the flap, for this tissue can hardly receive blood enough for its own

* Velpeau's Operative Surgery, Mott's ed., Vol. i., p. 701.

nutrition, and cannot, therefore, transmit any for the support of parts beyond.

The existence of cicatricial tissue in the base of a flap may, therefore, be expected to result in its mortification. When it exists upon the outer end of a flap, it is likely to mortify, and may, therefore, as well be cut away at the time of the operation. Where, however, the cicatrix is imperfect, it may in some cases, be left on the border of a flap to take its chances.

2. The base of a flap must be broad enough to permit a free supply of blood, and not be so much twisted, as materially to compress the vessels. It is, therefore, sometimes necessary to permit the stages in the journey of the sound skin to supply the place of a cicatrix to be shorter and more numerous than one might think necessary.

3. It is necessary to avoid stretching a flap. Parts that have an abundant supply of blood, may be put upon a moderate degree of tension, with an expectation of their preserving their vitality and of uniting by adhesion; but this cannot be said of flaps, the circulation in which has been cut off on three sides.

In this traveling of flaps, it is not very important that they should unite in all their parts by adhesion, as the granulating process will finally fix them in their new positions.

In unmindfulness of the conditions here stated, Mr. Coote refers to the difficulty of preserving vitality in a flap which has cicatricial tissue in its pedicle, and, therefore, despairs of effecting the removal of a cicatrix by the implantation of sound skin.

He would try mechanical extension alone, and he thinks it possible to elevate a depressed lower lip by this means. How he is going to get his "mechanical extension" attached to the lower lip he does not deign to tell us.

His objection, that a cicatrix is fatal to a flap, should simply be a warning not to have a cicatrix in a flap, instead of authorizing an emphatic injunction to let the cases alone.

In fact, no greater triumphs of surgery have ever been achieved, than some of those of relief from cicatricial contraction, by complete extirpation of the cicatrices, and the supply of the parts with sound skin.

The advice is given by Dr. MÜTTER, in cases of burns upon the neck, to employ a collar, which is to be gradually raised in front by a screw, turned a little from time to time. Such an appliance cannot, of course, be worn when the injury affects the base of the jaw, and the cases must be exceedingly rare in which the injury of the neck fails to involve the chin and lower lip.

Dr. PANCOAST very properly says, that "It is scarcely possible to correct these deformities by bandages and machinery, and it becomes necessary, to treat them with any prospect of success, to resort to some form of operation with the knife."

It is probable, that failure has often resulted from an under estimate of the amount of dissection necessary; or from undertaking to do too much at one operation. Sound skin must sometimes be made to migrate by successive journey and sojourn, until it is ready to be implanted in place of the cicatrix, the complete removal of which, is one of the last acts in the process.

It will often be found, upon dissection, that a cicatrix which appeared to be confined to the skin, really extends down a considerable depth. In this case, the knife must secure a complete relief from contraction, or some degree of disappointment must result.

DELPECH, long ago, abandoned the method previously pursued, of simply dividing the sub-cutaneous cicatrix, and resorted to the method of completely extirpating it, with increased success.

VELPEAU would confine the method of extirpation, to cicatrices of not more than from six to ten lines in width.*

There are some cases of narrow bands, in which it is only necessary to cut them across, and to hold the part extended by mechanical means, until the new cicatrization draws in the skin from the circumference, instead of drawing in the longitudinal direction, as in the production of the deformity.

In some of these cases, the third variety of the first method may be employed, imitating DIEFFENBACH'S plan of closing fistulous orifices of the urethra.

One of the figures in MÜTTER'S contribution in PANCOAST'S

* Velpeau's Surgery, Vol. i., p. 380.

Surgery, represents a contracted elbow, which was relieved by cutting out the cicatrix, and making a lateral incision on each side of the arm, to enable the lips of the wound to be brought together. The cicatrices resulting from the healing of the lateral incisions could produce no deformity, because one exactly balanced the other.

More often, however, the second and third methods have to be resorted to, and it is easy to conceive, that when the deformity is on an arm, the sound integument may be brought from the chest in the fifth or Taliacotian method, and when it is on the fore-arm, the supply might come from the chest, from the arm, or fore-arm of the other side, or from the nates or the thigh of the same side. When the deficiency is in the thigh or leg, the sound integument might be borrowed from the other limb.

In a case of contraction of the elbow in a child, from a scald upon the front of the arm and fore-arm, which came under treatment by the writer, a large flap was taken from the side of the chest by the method of jumping, and applied to the arm, the base of the flap being at the anterior fold of the axilla, with an excellent result.

In this case, the cicatrix was dissected up and allowed to glide to the fore-arm, to take its chances for life, where most of it sloughed away.

The malposition of the fingers from burns is the most difficult to remedy, from the thinness of the integument and the great difficulty of supplying it from other parts.

The removal of a single finger, which has become useless, may be better than to leave it in the way, and the peeling of a finger and the removal of its phalanges, may sometimes afford a supply of integument to the adjoining finger.

The prevention of the webbing of fingers after burns, is exceedingly important, for the cure is more difficult than the prevention.

The wearing of a lead wire between the fingers, with the ends strapped upon the hand, as advised by DIEFFENBACH, either in the treatment from burns or after operations, promises the best

result. In case of an operation, the implantation of a portion of sound integument in the fork of the fingers, when it is practicable, shortens the period of treatment, and gives the greatest degree of flexibility. T. Holmes, advises to wear a metalic plate, to prevent the progress of closure down the fingers. The ends of this may be secured to a bracelet, or the metal, in the form of a ring, may be inserted, like an ear-ring, above the commissure of the fingers, and when the process of cicatrization has been completed, the ring may be removed, and the artificial orifice, previously kept open by the ring, then closes up.

Dr. Buckminster Brown* recommends a silver hook or fork, of the size of a small quill, the bend of the hook lying in the space between the fingers, while one branch extends up on the back of the hand and the other upon the palm, where they are held by a rubber cord passing from an eye in each branch, up to a bracelet worn around the wrist.

With regard to the time when it is proper to operate for the extirpation of a cicatrix, writers are pretty unanimous in the opinion, that it should be postponed until it has acquired a permanent character. Then it is fully settled to what extent mechanical means have failed to arrest the progress of deformity, and the cicatrix itself has acquired its minimum size.

If, however, it is intended simply to divide the cicatrix in order to extend the part, and to induce a change in the direction of the movement of the sound integument, as it is drawn by the diminishing cicatrix; it is obvious, that the sooner it is divided and the part brought to its normal relations, the sooner the contraction in the chosen directions, will commence.

When adhesion is taking place, as between toes and fingers, the division cannot be effected too soon, in order that substances may be interposed, to prevent a recurrence of the union.

Cicatrix without a preceding wound or burn.

Sometimes, a cicatrix forms without any preceding wound or burn or frost-bite, to account for it. When this appears in the palm of the hand, in those who handle tools which harden the

* Boston Medical and Surgical Journal, June 27, 1867, p. 432.

cuticle, the contraction is apt to be ascribed to the pressure, but, in rare instances, it occurs in hands which are not thus employed.

Dr. MÜTTER's language is so much to the point, that I quote it:—"I have known the fascia of the palm of the hand gradually harden, contract, become thicker, and eventually inelastic, thus causing a permanent closure of the hand, the skin covering it being perfectly soft and pliable, while the cause of this change of structure was too subtle to admit of detection. * * This contraction is also frequently brought about by keeping a part too long in one position, and it may result from chronic inflammation of parts, either above or below the fascia."*

This distortion appears, upon a superficial view, to be in the tendons, but a more careful examination shows it to be in the fascia.

The inefficiency of all plans of treatment, makes it an unwelcome subject to write upon, as well as to practise upon.

The plan of producing minute divisions, both of the cicatricial skin and the subjacent tissues, is practised by Mr. Skey† upon the theory, that "The contraction of wounds is light in proportion as the time consumed in healing is short." If, however, the distorted parts are brought to their normal relation by extending the minutely divided cicatrices, it is difficult to see how much better it can be, to have numerous small cicatrices than fewer large ones, unless something may, by this expedient, be gained in the pull upon the sound skin in the lateral directions.

AUTOPLASTY OF PARTICULAR PARTS.

Rhinoplasty.

The art of reproducing a lost nose, formerly held a much more important position than it can ever hold again, partly because it is better known how to arrest the destructive ravages of syphilis, which so often manifests its secondary stage in the bones of this organ, and partly, because the advance of civilization abolishes the mutilation of the body as a punishment for the violation of laws.

* Dr. Thomas D. Mütter, quoted from Pancoast's Operative Surgery, p. 360.

† Holmes' Surgery, Vol. iv, p. 821.

Five methods have been pursued:

I. The direct sliding of integument toward the median line from the cheek, on one side, or both. LARREY and DIEFFENBACH are said to have practised this variety of sliding, and it may serve for covering fistulous openings, or for supplying losses involved in the removal of cancerous degenerations, but the supply, and the extensibility, are obviously insufficient for manufacturing a complete nose.

II. (1.) Deficiencies of the ala may be supplied by moving a flap in a curvilinear direction, admitting of closure of the denuded spot left by the flap removed. This is done by cutting under, and sliding the integument in a direct line over the space left vacant by the removal of the flap.

(2.) The covering of the part, by means of an angular flap, leaving the space uncovered from which it is taken, may, in some cases, be necessary.

III. *Jumping.*—Partial deficiencies of the nose, may be conveniently supplied by dissecting up a flap from the cheek, turning it around a half circle, and attaching it in its new situation. The mobility of the integument of the cheek, permits it to be cut under and brought together, so as to cover the place from which the flap had been taken.

In one case in which the writer pursued this method, after removing a portion of one side of a nose for a cancerous degeneration, the pedicle, which it was purposed afterward to remove, was so free from offensive appearance, that the patient declined to have the final operation of complaisance performed.

For the reconstruction of a whole nose, or the greater part of it, the favorite method is that of jumping a flap from the forehead. A flap is dissected up and bent around, until its raw surface is applied upon the nose, where it is attached to surfaces previously denuded.

Either variety of this method may be pursued: (*a*) that of cutting down upon one side lower than the other, by which the flap may bend around without making a coil, and (*b*) that of *torsion*, in which the substance of the pedicle is necessarily doubled upon itself. The flap is made large enough to allow

for shrinking—about one-third larger than the measure of the space to be covered. The advantage of the first variety of this method is, that it permits the vascular supply on one side to remain nearly undisturbed.

In the formation of a nose by this method, PANCOAST attached great importance to beveling and dovetailing the surfaces to be united, in order to increase the extent of the surfaces, so that, in the event of partial failure, the chances of union in some parts might be increased.

This was done by cutting the flap with a larger surface internal than external, and in preparing for the reception of the flap, by dissecting and turning toward the median line some of the integument of the nose, and cutting under the integument outside of this incision, so that the edge of the flap might go in

Fig. 13. Before Operation.
Dr. J. Mason Warren's Case of Rhinoplasty.

like a wedge between these raised sides, and present four surfaces instead of two, *viz.*, two surfaces upon the flap, *i.e.*, the two sides of the wedge, and the two surfaces made upon the stump of the nose in the groove for receiving the flap. It is doubtful, however, whether any such complication at any time increases the chances of union.*

While the union of the flap, and its permanent adaptation to its new form are in progress, it is kept elevated over substances placed beneath it, and a tube is placed in each new formed nostril, to enable the patient to breathe while his mouth is closed.

This packing may conveniently be made of lint, permeated with the solution of chloride of zinc, in water, and glycerine, already described in the Introduction. The zinc and the gly-

Fig. 14. After Operation.

* Pancoast's Operative Surgery. Velpeau's Surgery, Mott's ed., Vol. i., p. 687.

cerine retard putridity, not only in the packing, but upon the neighboring tissues.

If the columna fails to attach itself, or slouches off, another operation becomes necessary to supply or reattach it.

The final modeling of the pedicle, should be done so as not completely to cut off the original source of vascular supply, lest the new nose should shrivel for want of sufficient nutrition.

Figs. 13 and 14, represent a case of destruction of the nose, operated upon by the late Dr. J. Mason Warren, of Boston, in 1835. The cut showing the result, represents the space on the forehead partially closed by granulation.

Dr. Warren, in his description of the case, says, that in order to secure the proper projection of the alæ of the nose, he pursued the plan recommended by M. Labat, which consists in tying the suture over a compress so as to indent the surface at the line of incision, and hold it there until after union and moulding of the parts. The cut shows the expedient to have been perfectly successful.*

IV. It may be suggested, that since the success of M. Ollier in plastic operations upon the periosteum, it may be found practicable to turn toward the medium line the periosteal covering of the margin of the maxillary bone previous to bringing down the flap from the forehead, so as to have a firm base upon which the flap may rest. This is in accordance with the fourth method.

In dissecting up the marginal integument, in order to turn it over and give it the position and function of the mucous membrane of the nose, the periosteum can be peeled up with it, so that, when turned over, it will become exterior. The stitches will, of course, come out of their position by ulceration, and be discharged through the nose, anterior or posterior. The flap will fit down over this, affording two extensive surfaces opposed to each other for union.

This expedient, besides aiding in preserving the form which may be given to the new nose, may secure to the flap a better

* Surgical Observations with Cases, by J. Mason Warren, M.D. Boston: 1867.

nutrition, and thus prevent the atropathy which has sometimes frustrated the final success.

M. OLLIER relates an instance, in which a layer of the nasal process of the superior maxillary bone, (the nasal bones having been destroyed or arrested in their development,) was pared off, and turned over to make a foundation for the flap brought down from the forehead, which had been dissected up with the periosteum attached. Thus, the foundation was osteo-cutaneous, and the flap periosteo-cutaneous.

The parts were kept in apposition by sutures of iron wire, and the denuded space upon the forehead, was covered with integument, by cutting under and stitching over. Eighteen months after the operation, the nose had retained nearly the shape originally secured to it by the surgeon.

M. OLLIER says, "This observation seems to demonstrate the utility of combining osseous, or direct osteoplasty, with periostic, or indirect osteoplasty, for the restoration of the nose.

"In relation to the fact of the production of bone; at the end of three months from the time of the operation, we could pierce, with a needle, the parts not yet ossified, but a year later, the same parts could not be penetrated.*

LANGENBECK has recently recorded three cases of rhinoplasty, in which the periosteum of the frontal bone was brought down with the flap, in order to give greater firmness to the new nose. In one of these cases, new bone was found to have been produced in four weeks, in the second in eight weeks, but the third was a failure, the flap sloughing.

Dr. GEO. BUCHANAN, Surgeon to the Glasgow Royal Infirmary, relates a case in which he performed rhinoplasty, preserving periosteum in the flap, after LANGENBECK'S example, whom he had seen operate in the same manner, but without getting any formation of bone in the nose.†

* Traité Experimentale et Clinique de la Regeneration des os, et de la Production Artificielle du Tissu Osseux, par L. Ollier, Chirurgien en Chef, de l'Hotel-Dieu, de Lyon. Paris: 1867. Tome ii., pp. 463 and 521.

† *American Journal of the Medical Sciences*, October, 1865, pp. 541 and 543; from the *Lancet*, August 5, 1865.

There is nothing in this operation which ought to be considered dangerous to a person in good health, but, upon the authority of VELPEAU, DIEFFENBACH lost two patients out of six, upon whom he performed rhinoplasty in Paris.*

The mortality should probably be ascribed to the character of the patients, rather than the character of the operation.

Taliacotian Method.

V. The method by the acquisition of integument from some distant part, though previously practiced in Asia, acquired great celebrity from TAGLIACOZZA, Latinized TALIACOTIUS, who practiced it with success in Italy, in the sixteenth centnry.

In most works on surgery, a picture may be found representing the patient invested, head, neck, and trunk, in a close-fitting

Fig. 15. Retentive Apparatus of Taliacotius.

* Velpeau's Surgery, by Mott, vol. i.; Holmes Coote, in Holmes' Surgery, vol. iii., p. 121.

jacket, by which the face is enabled to hold the arm attached to it, by a similar investment. In accordance with this fashion, I insert (Fig. 15,) an exact copy of a picture, in the original folio edition of the works of TALIACOTIUS, bearing the date of 1597, which I have been permitted to copy from Dr. J. MASON WARREN'S "Surgical Observations."

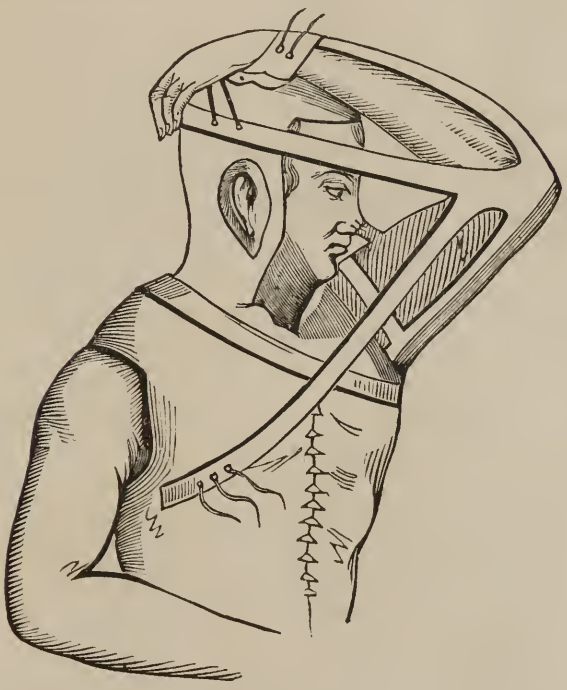


Fig. 16. Dr. Warren's modification of the retentive bandage of Taliacotius.

Fig. 16, represents a modification adopted by Dr. WARREN, for a successful case of rhinoplasty, performed by this method. The integument to supply the lost portion of the nose, is seen to have been taken from the fore-arm.

The object of this is to hold the arm to the face, until the implanted flap has time to form its new vascular connexion, after which, it is cut from the arm, and the process of confinement discontinued. It would seem impossible to avoid a considerable amount of movement by any expedient which does not

not include an iron framework, and a cut is here introduced, to represent the framework of an apparatus which will serve for all plastic operations upon the head and neck, for which immobility is important.

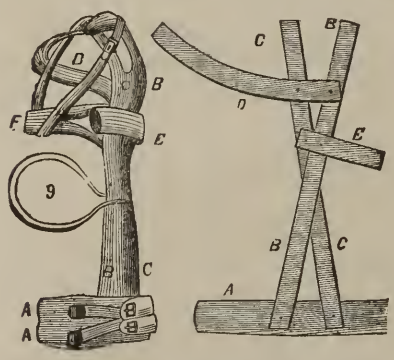


Fig. 17.

A framework of iron for securing immobility of the neck, in plastic and other operations requiring motionlessness of this part.

The right hand figure, (17,) represents the frame alone, and the left hand figure represents it covered, to secure immobility, after the division of the sterno cleido-mastoid muscle. An investment on the same principle may be made for the arm, and when the two are fastened together, the immobility must be sufficient to save the patient the voluntary effort of holding still.

VI. *Grafting.*—There is a tradition that in India, a portion of integument is sometimes taken from the nates after repeated beating with a light shoe, to induce increased vascularity, and directly grafted upon the face, to make a nose. As failures must be the rule and success the exception, it is not probable that the truth of history will be very soon verified by repetition of the experiment.

Otoplasty.

Autoplasty of the ears, is chiefly required for the correction of the effects of wounds and burns, and the expedients must be varied according to the necessities of each particular malformation. The development of principles, and the explanation of the application of expedients to other parts, renders any especial attention to this organ unnecessary.

Blepharoplasty.

The loss of an entire eyelid, admits of but a very imperfect restoration. It must be made from integument of greater

thickness than that of the natural lid, with greater thickness of subjacent tissue. Its ocular surface must be cicatricial, or made of skin inverted, which cannot be expected to soften sufficiently to fully replace the mucous membrane. The preservation, therefore, of the mucous membrane, the cartilage, and the ciliary margin, very much lessens the difficulties to be overcome.

The restoration of the upper lid, is generally figured and described after FRICKE, of Germany, as a jumping of the flap from over the frontal bone. An incision in the form of the capital letter L, is made so that the horizontal part is below the brow, and the vertical part upon the temple. The horizontal incision below the brow and above the elevated or retracted eyelashes, is widened until the eyelashes descend to their proper level. A second vertical incision is made, parallel with the first, and the space between the two is dissected up, to constitute the flap with which to repair the upper lid. The L may

Fig. 18.

Third method, 1st variety. Entire destruction of the skin of the upper lid, followed by complete eversion of the lid, the eyelashes being drawn up against the brow, and the globe permanently exposed. The dotted line indicates the place and shape of the flap.

Fig. 19.

Third method, 1st variety. The final result. The eyelashes are brought down to their proper position. There is slight mobility to the lid, and the patient sees out from under it. There is a permanent fulness, in consequence of the thickness of the subcutaneous tissue.

be turned over and the flap taken from the cheek; and in the case which is here figured, (Fig. 18. and 19.) there was already a scar on the cheek, occasioned by the original slough which destroyed portions of the integument, not only above the eye, but also below it.

Case II.—Miss R., aged about 20, lost the integument of the upper lid, and a strip of integument below the lower lid, in June, 1866, from plegmonous erysipelas. The upper eyelashes became firmly fixed, under the brow; the mucous membrane everted, and hypertrophied, and the eye-ball permanently exposed. The space resulting from the destruction of integument, below the lower lid, became covered by a cicatrix, not very conspicuous, without everting the lid.

Operation. Nov. 24th, 1866. It was thought that, taking the flap from alongside of this scar, could have no worse effect than to widen the scar somewhat, while, if the flap should be taken from the temple, a new scar would be produced of a much more repulsive character. The end proved the propriety of the choice. A very moderate degree of cutting under, permitted the skin below, to come up and unite, with so slight a scar, that the engraver should have made his lines very light, to represent the scar, if he attempted to make any at all.

A careful dissection of the upper lid was made, until the ciliary margin came easily down to its proper position, when the flap was applied, so as completely to cover the raw surface. The retention was effected by sutures of delicate iron wire, introduced about a-quarter of an inch from each other, all around. Isinglass plaster was then applied, to obviate motion.

Some erysipelatous swelling followed, upon the face, which was speedily arrested by the mixture of chloride of zinc, glycerine and water, already mentioned.

Adhesion of the flap occurred throughout the greater part of its extent, and granulation completed the restoration.

Feb. 20th, 1867. A second operation was made to narrow the pedicle, and thus elevate the outer angle of the eye; and two months later, an additional strip was taken from the pedicle, to elevate the angle still more.

The restored lid has a considerable degree of motion, and it opens sufficiently for the necessities of vision, but an unnatural fulness remains, in consequence of the amount of subcutaneous tissue.

It is impracticable, as a general statement, to replace the upper lid, in whole, or in part, by the first or second method, without interfering with the regularity of the brow, while by the jumping process, in the third method, whether from the forehead or from the cheek, the pedicle, or base of the flap, is beyond the extremity of the brow, which thus escapes mutilation

The restoration of the lower lid admits of greater latitude in the choice of the method, for the material for repair may be taken from the region directly below, or that upon the outer part of the cheek.

In the choice of methods, the tendency of the lower lid to become everted by the shrinking, or the retraction of integument should not be forgotten. The first and the second methods, the sliding in the direct line, and the sliding in a curved line, are amenable to this objection, while the third method, by jumping, admits of the implantation of such a width of flap as to render this result very improbable.

Figures 20. 21. and 22. are introduced to show the two varieties of the second method, as applied to the lower lid:—

Fig. 20.

Second method, first variety; repetition from figure 8, from *Erichsen.*

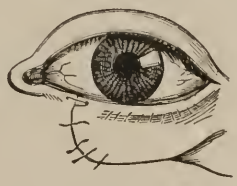


Fig. 21.

Second method, first variety; repetition of figure 9. The appearance at the close of the operation.

After sliding up the flap, bounded by the dotted line, the integument of the cheek is cut wider, so that the space is all covered with skin, at the close of the operation.

The operation, according to the first variety of the second method, is so managed that the sound skin crowds the flap against the lid, but the second variety, as here shown, is especially faulty, for it combines the danger of subsequent retraction, with the evil of leaving a large portion of the surface, from which the flap is taken, to heal by granulation.

Fig. 22.

Second method, 2d variety, from *Serre*, repetition of figure 10.

The lower lid having been depressed by cicatricial contraction, resulting from destruction of tissue, the space is made raw, and a parallelogram is brought over from the outside, and retained until it grows fast in its new position; *a*, space from which the flap has been taken; *b*, flap in its new position.

The third method, by jumping, admits of closing the place from which the flap is taken, by undercutting its margin, and bringing the borders of the integument together, and retaining them by sutures and plasters.

There is a proceeding, according to the first method, which may be employed where a narrow cicatrix depresses a portion of the lid, but it is inapplicable to an extensive cicatrix. It consists of making a V shaped incision, dissecting up the integument between the lines, in the manner of a flap, which thus has permission to retract, and then undercutting the marginal integument, and bringing it together from the two sides, so that one vertical line takes the place of the lines of the V, except at the top, when the retracted V flap is compressed by the approach of integument from side to side, resulting in a Y, instead of a V.

The operator must make a larger estimate, as to the amount of integument to be dissected up, than he would think necessary, without experience.

In operating upon immature boys, it is, of course important that the flap for supplying any deficiency below the lid, should not be taken from the portion of the cheek which usually becomes the seat of beard.

For eversion of the lids (ectropium), without diminution of cutaneous tissue, the ordinary operation of cutting out a V shaped portion of the lid, in order to diminish its length, and cause it to apply more closely to the globe, with the removal of an elliptical portion of palpebral conjuctiva, if it is very redundant, may answer very well, but this will be useless if there is retraction of integument, unless some method is adopted to stop the traction which turns the lid over. Nothing but a more liberal supply of integument will do this.

Inversion of the Lids (entropium), resulting in a scratching of the eye, by the eyelids (trichiasis), is a much more troublesome deformity, threatening the loss of sight. It usually grows out of long continued inflammation of the conjunctiva, changing its texture into a pseudocicatricial substance, contracting in all directions, diminishing the depth of the fold between the eye and the eyelid, and by encroachment at the external angle, lessening the length of the palpebral fissure.

The simplest operation is that ascribed to CELSUS, of removing an elliptical portion of skin upon the upper lid, after which the lips of the wound will come together without undercutting —the first variety of the first method.

DES MARRES has increased the efficacy of this operation, by directing, that the strip of integument removed, should be close to the ciliary margin, in order to have more effect in everting the eyelashes.

Then, we have the frightful mutilation of the cartilage of the upper lid, proposed by CRAMPTON, and modified by GUTHRIE, in which vertical incisions are practiced, and the warping of the cartilage is attempted to be taken out of it by the continued traction of ligatures, fastened upon the forehead.

JAESCH proposed, in 1816, a plan, afterward modified, by ARLT, and quite recently adopted and recommended by Dr. E. PERCIVAL WRIGHT, of Dr. STEPHENS' Hospital, Dublin, which consists, first, in the performance of DES MARRES' operation— removing a strip of integument just above the ciliæ, and then dissecting up a bridge of skin, including the ciliæ from the cartilage, and sliding it up, to occupy the place left vacant by the

removal of integument. Great care is enjoined, not to contuse the delicate isthmus, as there is great danger of its sloughing.*

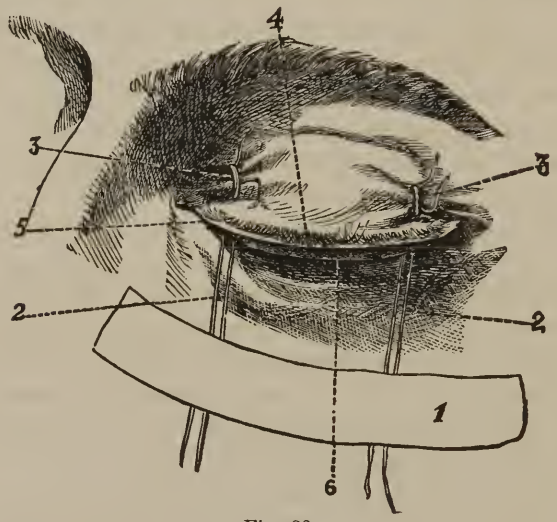


Fig. 23.

Dr. Hildreth's operation for entropium.

1. Method of securing the cords which control the levator.
2, 2. Cords holding the levator.
3, 3. Stitches securing proper position of external integument.
4. Ciliary border.
5. Lachrymal punctum.
6. Border of tarsus, projecting below the ciliary margin.

Dr. Joseph S. Hildreth, of Chicago, has devised an operation, somewhat similar to that of Jaesch, only that there is no strip of integument removed from the upper lid, and there is, consequently, no isthmus of integument including the ciliary matrices to be in danger of sloughing. The skin, orbicularis muscle, and ciliary margin, are dissected up from the cartilage, and the skin, with the underlying orbicularis, are maintained in a folded condition, by a suture at either end of the lid, as represented in *3*, *3*, Fig. 23. Then a thread is passed from the mucous side over one border of the levator palpebræ, and without penetrating the skin, it passes out again through the

*See *Dublin Quarterly Journal*, for February, 1865.

mucous membrane; another similar thread is passed through and over the other border, in the same way. The threads *2*, *2*, are then brought down upon the cheek, and retained by the plaster, *1*. This is in order to hold down the cartilage, until the integument and orbicularis form a new attachment, high enough up, so that the eyelashes will not again project from the cartilaginous margin over upon the globe.

SAUNDERS proposed to take out a portion of the inferior border of the cartilage; and others have cut off cartilage, eyelashes, and all, as if in despair of affording relief by any conservative method.

The recognition of the contraction of the conjunctiva, and the shortening of the palpebral fissure, has led to the attempt to create a new external canthus, by establishing a fistula by means of a silver wire, and afterwards cutting out between the canthus and the fistula. And again; the canthus has been elongated by incision, and the conjunctiva has been drawn out and stitched fast, as in DIEFFENBACH'S operation for elongating the fissure of the mouth (the 2d variety of the 4th method).

This last expedient fails, because the supply of mucous membrane is already too small for its legitimate purposes, without affording any material for elongating the palpebral fissure. The indication is, to lengthen the palpebral fissure, to diminish the closeness with which the upper lid glides upon the eye, and to enable the operation of DES MARRES to evert the eyelid. It is to fulfil this indication, that a new operation is proposed, which, instead of attempting to supply the deficiency out of mucous membrane, supplies it out of skin, by the implantation of integument behind the outer portion of the upper lid; the first variety of the fourth method.

Operation.—From a point in a line drawn horizontally through the external canthus, and about $\frac{1}{16}$ of an inch from the canthus, carry an incision downward and inward from one-third to one-half the length of the lower eyelid, and parallel with its ciliary margin. Make another incision, beginning at a point $\frac{1}{5}$ of an inch further out in the same horizontal line, cutting downward and inward, and meeting the other incision at its lower extremity.

If the incisions are made by a narrow-pointed bistoury piercing the skin and cutting out, it is best, in making the second incision, not to bring the point of the bistoury out exactly at the lower end of the first incision, lest the skin should slide over the edge of the knife and make the flap too short. The integument between the incisions, down to the orbicularis, is then dissected up as a triangular flap, beginning at the apex below. The flap is then turned up, and its apex is transfixed with a needle attached to a silver wire, having, also, a needle attached to the other end. This affords a convenient means of holding up the flap. Care should be taken here, as in all cases where it is expected to escape suppuration, to avoid contusion of the flap by the pinch of forceps. It is better not to use forceps at all in this operation, but to lift the point of the flap with a tenaculum, and as soon as sufficient integument is raised, to transfix the flap with the needle, which affords an adequate handle to it.

Then, under the base of the elevated flap, an incision is carried in the horizontal line already indicated, through the canthus, deep through the fibres of the orbicularis, down to the bone, and outward to the upper end of the outer vertical incision. The mucous membrane is then freely incised behind the outer portion of the upper lid, so as to permit the easy elevation and eversion of the lid. The flap is then doubled upon itself, and drawn under and behind the outer portion of the upper lid, being drawn into its new position by the wire suture previously introduced through the flap. To this end, the points of the needles are introduced, about $\frac{1}{4}$ of an inch apart, behind the outer portion of the upper lid, and brought out through the integument beneath the brow. Care should be taken to introduce the points of the needles in the dissected space, where an open space has been created in the mucous membrane. The object of this caution, is to secure the contact of the areolar tissue of the flap, with the corresponding tissue behind the lid, in order to make union possible. The inverted integument thus comes to occupy the position, and to perform the function of mucous membrane. The wire is twisted over a compress for

the protection of the skin from ulceration, and it is left in five days or longer.

For the easy extraction of the silver wire, it is convenient to have put a thread into the loop, before drawing it in. This should be tied down upon the wire, in order that it cannot, by any possibility, become displaced, instead of leaving it loose as shown in the cut. After cutting the free ends of the loop coming out below the brow, a gentle pull upon the thread which hangs out at the canthus, readily extracts the loop in the direction contrary to that in which it had been introduced.

The two lines bounding the space from which the flap had been taken, are made to meet by a little undercutting of the margins, and retained by interrupted sutures. The nearness to the margin of the lower lid, to be observed in making the first incision, depends upon the amount of eversion to be secured to the lower lid. If there is no inversion of the lower lid, the flap should be taken from a space more distant, and *vice versa*.

The accompanying illustrations, Figs. 24. 25. will render the account more intelligible.

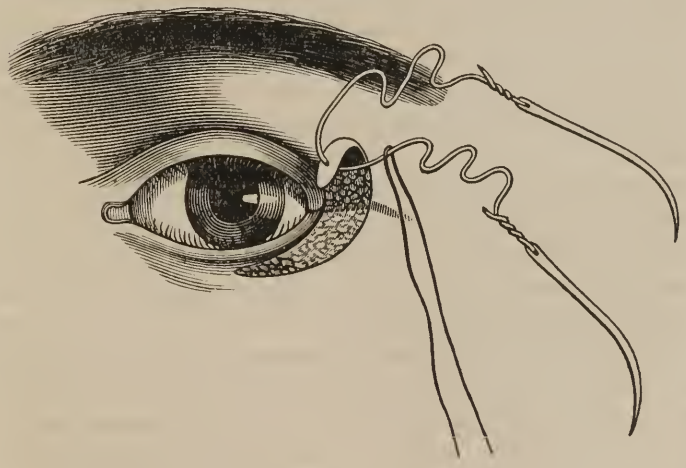


Fig. 24.

A new operation for entropium, by inverting a portion of the integument of the face behind the upper lid. The flap is seen dissected up.

Fig. 24. represents the external commissure, contracted by inflammation. The space from which the flap has been dissected, is seen below the outer part of the lower lid, and the flap itself is turned up, with the wire passing through it. A dotted horizontal line shows the place in which the deep incision is made, to extend the external canthus.

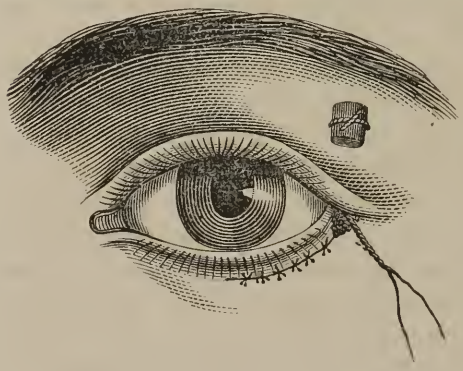


Fig. 25.

The operation completed. The flap has disappeared, and is retained by a suture tied over a compress below the brow. The space from which the flap was taken is covered by the adjoining integument.

Fig. 25. represents the operation completed. The flap has disappeared behind the upper lid, and the retaining suture passes out under the brow, and is twisted over a compress.

The ligature for the retraction of the suture is seen hanging out at the external angle. The integument adjoining the space from which the flap had been dissected, has been brought together and is retained by interrupted sutures.

In the cases of entropium which require this operation, it will generally be necessary to perform that of Celsus, or Des Marres' modification (the first expedient mentioned in the preceding enumeration), in order more perfectly to effect the eversion of the ciliary margin.

In cases in which chronic inflammation and long-continued granulation have produced a marked diminution of the oculo-palpebral fold, the plan of inversion of integument may be applied to both lids. A strip of integument may first be taken from the upper lid, immediately above the eyelashes, after the method of Des Marres, and leaving it attached at its outer extremity, it can be attached behind or within the lower lid,

and after the complete healing from this operation, a strip of integument may be taken from beneath the lower lid, in the same way, and implanted behind the upper lid. We thus combine the most efficient means of everting the ciliary margins, with a mode of supplying redundant skin to take the place of deficient mucous membrane. The only deformity which is left by this operation, is a somewhat unnatural fulness above the external commissure, which, if desired, can be remedied by a subsequent operation, removing a portion of the integument which had constituted the base of the flap.

It has been suggested, that modifications of this operation may be made for symblepharon, in order to supply, to some extent, the deficiency of the mucous membrane, by implanting the delicate skin of the lids. This is very extensible, so that though a flap, at the time of its implantation, may seem very small, yet it is capable, after its adhesion in its new location, of great enlargement.

To remove any deformity which may arise from the increased thickness, when the flap turns in at either the inner or the outer canthus, the pedicle through which the vascular supply was first maintained may be cut away, after the circulation has been established through the adhesions in the new relations.*

Dr. I. Hays, of Philadelphia,† has secured some success in adhesion of the lids to the globe, by dividing the adhesions, and introducing a metallic plate between the lid and the globe, having it so shaped as to correspond with the curvature of the eye, or like the rim of an artificial eye. This is worn until the cicatrization is complete.

The writer, following this example, introduced a gold plate, with partial success, but there was so much difficulty in keeping it in position, that he determined, if he should have another case, to have a wire soldered near each end of the border, the lower border for the lower lid, and the upper border for the upper, to arm these with needles, and having introduced these

* A description of this operation was published in the *American Journal of the Medical Sciences*, for October, 1866.

† *American Journal Med. Sciences*, Jan'y, 1861, page 116.

deep and brought them out through the integument, to fasten the ends as represented in Fig. 25. It must be practicable, by this means, to hold the plates in position any length of time. The wearing of the plate may be combined with the insertion of a piece of skin, to increase the extent of the internal lining of the lids.

OPERATIONS INVOLVING THE MOUTH.

Many operators refrain from the administration of ether and chloroform, upon occasions of operations about the mouth, through fear of the entrance of blood into the air-passages. The immunity from any evil consequences from the entrance of blood into the larynx, in the following cases, and the writers' uniform practice of giving anæsthetics, in operations about the mouth, encourage the belief, that the risk of suffocation from the entrance of blood into the larynx, under ether, is altogether chimerical. Blood is readily removed by coughing, as the patient rouses, and if a clot should possibly close the glottis, the "ready method" would immediately displace it, either upward, or downward, as the patient rolls over, filling and emptying the lungs. The rolling of the patient over, in the horizontal position, being the method which it is imperative to employ, upon the least alarm, while the patient is in a state of anæsthesia, renders it impossible that a blood clot should resist the force of the atmosphere, as it enters and leaves the chest, with the expansion and contraction of the ribs. The local irritation of blood can be no more than that of so much mucous, as is shown by cases of hæmoptysis. The chief objection, therefore, to the employment of anæsthetics, while operating about the mouth, is the necessity for occasionally suspending the proceedings, to administer the anæsthetic.

Uranoplasty, or Palatoplasty.—To our countrymen, Dr. METTANER, of Virginia, Dr. PANCOAST, of Philadelphia, Dr. J. MASON WARREN, of Boston, and to KRIMER, VELPEAU, DIEFFENBACH, WUTZER, and LANGENBECK, abroad, we are indebted for the introduction of plastic operations upon the hard palate, in order to make the mucous membrane, together with the

periosteum, glide toward the median line, to fill up the fissure, partly by adhesion, and partly by granulation.*

Though the attention was not distinctly directed to the gliding of periosteum, in the earlier operations, it becomes evident, from the dissection of the dead subject, that the removal of the periosteum, along with the soft material covering the hard palate, is unavoidable.

According to OLLIER, DIEFFENBACH had the idea of moving the periosteum of the hard palate first, and WUTZER, of Bonn, first actually moved it, in 1834. M. OLLIER ascribes the ill success of attempts to close fissures in the hard palate, to the employment of instruments too delicate to peel off the periosteum with a sufficient degree of uniformity Indeed, the inequalities of the bony surface requires that some of the bone should be removed with the periosteum.

With regard to the age at which these operations are practicable; though the precept has generally been to wait for some discretion on the part of the patient, yet, according to OLLIER, BILLROTH, has closed the fissure in the hard palate at as early an age as two years.

Dr. KADE modifies the process of these operators, by dissecting the roof of the mouth from the fissure, toward the teeth, on one side, and, from the teeth, toward the fissure on the other. The flap obtained by the latter mode, is turned over, and made to pass between the other and the bone, in order to get a contact of periosteal surfaces.

The nasopalatine artery, passing through the incisive canal, is to be avoided, and also, the descending palatine artery, through the posterior palatine canal.†

Dr. MÜTTER, also applied a clamp to the cheeks, during the first period of infancy, to compress the bones of the face, and lessen the width of the fissure.

The union of the two halves of the cleft soft palate, first

* Pancoast's Operative Surgery, pp. 258 and 257. Surgical Observations and Cases, by J. Mason Warren, M.D., Boston, 1867.

† *American Journal Medical Sciences*, October, 1865, p. 541. *Ranking*, Vol. xli. Schmidt's Yarb. 1864.

attempted by GRÆFFE in 1817, and accomplished by ROUX in 1819, has been found by Dr. J. MASON WARREN and by Mr. FERGUSON to be greatly facilitated by parallel incisions, (the third variety of the first method in our classification,) taking care to divide the levator palati on each side, in order to suspend the disturbing movements of these muscles. They also divide the posterior pillar of the faucus, including the palato phanyngis, but G. D. POLLOCK says, (Holmes' Surgery, Vol. IV., p. 96,) that he has operated successfully without this expedient, and he thinks it unnecessary.*†

The importance of this operation, both upon the hard and the soft palate, has been considerably lessened, by the success with which artificial palates of flexible rubber have been adjusted.

Harelip.

Different operators have varied in their estimate of the age at which the fissure in the lip, corresponding with that which occurs in the palate, should be closed.

Dr. MÜTTER operated for harelip at an age as early as three or four days. FERGUSON, ERICHSEN, and HOLMES COOTE wait six weeks. SKEY and J. MASON WARREN advise to wait three or four months, but this last is obviously an inconvenient age, as the child may be suffering from the irritation of teething.

It is found that the process of sucking, when the operation is performed within a few days of birth, does not tend to pull the parts asunder, as any one will see by putting his mouth in position for that function. A few points are of importance:

1. A very free dissection of the lip from the jaw, and the nearer the bone the dissection is made the less will be the bleeding.

2. The line of the incision should be curved, with its concavity toward the fissure, in order that its approximation may produce some elongation, increasing the width of the lip at that point. The most convenient mode in which to make this incision, is to pass a wooden spatula behind the lip, and fasten it

* *American Journal of the Medical Sciences* for October, 1863.

† South's Notes to Chelius' Surgery, vol. ii., p. 27.

by inserting a tenaculum through the lip into the wood in the line of the joining of the prolabium.

The bistoury then cuts down upon the wood to the point of the penetration of the tenaculum, where the incision should cease. The opposite side being pared in the same way, the narrow strip is pulled down, and the two sides of the lip held a few minutes to compress the coronary arteries, or if the compressor is at hand, (Fig. 1.) it will answer the purpose much better.

3. The termination of the incision at the vermilion border on each side, should be examined and made to come accurately to this point, and should be extended sufficiently deep, so tha only a small portion will remain superficial to the incision. The object of this is, that the line of the red of the lip on the two sides may be brought together with perfect accuracy; and the redundancy of the material of the prolabium makes it practicable to avoid any notch. This proceeding of MALGAIGNE (Fig. 26.) is better than leaving the flap of prolabium all on one side, and paring off the prolabium on the other, to receive it, ascribed by HOLMES COOTE to Mr. LLOYD, an Englishman, while in Bernard & Huette's Operative Surgery, a translation from the French, the title to priority is given to MIRAULT, a Frenchman.

Fig. 26.

Malgaigne's method for Hare-lip. The dotted lines indicate the incisions.

4. The sutures should be metallic, in order that there may be no haste in removing them, and it is convenient to combine pins with wire. Let two pins be introduced deep, following the groove of a *grooved* director, and let them be retained by the plaster fastening already described, in order to distribute the pressure, and a thread may be tied around the pins and over the plaster, if it seems necessary. Let one or two interrupted sutures be taken near the nose, one exactly at the vermilion border, and as many more shallow stitches as may be called for to preserve perfect accuracy of the surfaces. Trim off the flaps

of prolabium, until a rounded surface is presented, and take an additional stitch on the vermilion surface.

5. After all this, draw strips of isinglass plaster across the face, so as to aid the sutures and cover up the points of the pins, which may or may not be cut off. The plasters help to diminish the mobility of the parts, and in this manner also aid in securing adhesion.

With metallic sutures, there is no necessity for early removal, and if they remain a week or ten days, they can then be withdrawn without fear of breaking up adhesions, though for safety, it may be advisable to renew the plasters and keep them applied a few days longer.

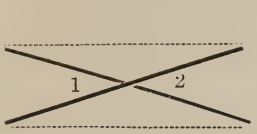
Holmes Coote, (in Holmes' Surgery, Vol. III.) following most of his predecessors, advises, in cases of harelip, to operate on each fissure separately.

I think this bad advice. It is better to cut away the intervening portion of the lip. The extensibility of the lip and the cheeks, permits the remaining parts to be brought together with less deformity, than attends the double operation. For this purpose, a pretty free dissection from the superior maxilla must be practiced, in order to permit the parts to slide together. Projecting primary teeth should be removed. The projecting os incisivum may be brought down suddenly by violence, or gradually by carefully regulated pressure, but the most summary way, is to cut it off by nippers.

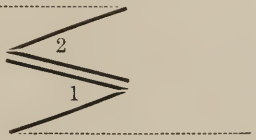
Cheiloplasty.

The facility of sliding, which leads to the universally adopted method for harelip, admits of modifications of the same method, for restoring other deficiencies of the lips. The advantage of this method over that by sliding in a curved line, or that by jumping, is that the red of the lips is more easily preserved. A curved incision on each side of the nose, may be necessary to enable the two flaps to be drawn together from each side. If the length of the labial fissure is too much shortened, it can be lengthened by the process of Dieffenbach, about to be described.

For a narrowing of the vertical width of the upper lip, where the vermilion border is preserved, Mr. TEALE, of Leeds, England, has made a very simple device, which consists in making two > shaped incisions, with their points together, as represented in the diagram *A*, after which the two triangles are



A,



B,

made to glide alongside, one above the other, by which the space is widened, as represented in diagram *B*, showing 1 and 2 in a vertical line, instead of the horizontal line which they originally occupied.*

The encroachment of the angle of the mouth on one side is best remedied by the operation of DIEFFENBACH, though SERRE says that WERNECK, another German, was the real inventor. This consists in dissecting out from the angle of the mouth, such a portion of skin and subjacent tissue, about two-thirds of the way through the cheek, that when the mucous membrane is divided in a median horizontal line, each half will cover the wound, making a vermilion border, exactly like the natural prolabium.

For this purpose, two horizontal incisions are made with a bistoury or the sharp-pointed blade of scissors, inserted from the direction of the mouth, after which the tissues are most easily gouged out with forceps and scissors. If, after cutting the mucous membrane and bringing it over, it does not correspond with the red of the lip, more skin must be taken away, until there is a good fit. The skilful performance of this operation leaves the mouth without any mark of its previous condition, and the mobility of the orbicularis oris is very little impaired. The sutures should be numerous and are conveniently made of very fine iron wire, which occasion no irritation, and which readily cut out and free themselves if adhesion fails.

* *Ranking's Abstract*, No. 26, July to December, 1857.

The more full consideration of lip-mending will follow that of cheek-mending.

Genioplasty.

Scars upon the cheek, and grooves, there and elsewhere, admit of being obliterated by paring off the skin very superficially, cutting under the margins, bringing the incised surfaces together, and retaining them in contact. (Second variety of the first method.)

Small orifices admit of closure in the same way. In these cases, there is a choice, to pare away the marginal skin and detach it altogether, or to turn it in, according to the fourth method. Larger deficiencies require dissection from the jaws to increase the extensibility, and when the opening is too large for the practicability of this variety, the fourth variety may be resorted to. (Figs. 27. 28.) This is the favorite method of

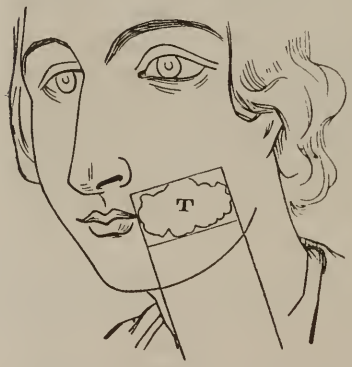


Fig. 27.

Gliding plan. First method, fourth variety. French method; transverse incisions and cutting under.

From Serre.

Fig. 28.

First method, fourth variety. The operation completed.

From Serre.

Serre, who denominates it the French method. This proceeding, is in this position free from the tendency to retract, which renders it an improper expedient when applied to the repair of a lip or an eyelid.

When the deficiency is still greater, the third method (jumping) admits of moving integument a greater distance without

distending it, and this is, therefore, the more practicable method. This cannot be better illustrated, than by the following case:

CASE III. *Destruction of the right cheek, the whole lower lip, and half the upper lip.*

Mary Bowers, a delicate child, 6 years old, lost the right buccinator muscle, with the parts covering it, and the lower lip down to the base of the alveolar process, half the upper lip, and portions of the upper and lower maxillary bones. Fig. 29 affords a good representation of the state of the parts at the time of the first operation, April 28, 1866.

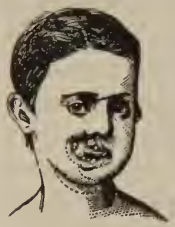


Fig. 29. Third method, first variety. Destruction of the right cheek, half the upper lip, and the entire lower lip. The dotted line indicates the incision enclosing the flap, and the amount of integument turned in, to line the future cheek with integument. 4th method, 1st variety.

A very close false anchylosis existed, and the patient fed herself at the side of the mouth, where the opening was largest. There was also a band of cicatrix near the angle of the mouth in the left side, which made it impossible to place a finger between the teeth and the cheek. This is supposed to have been a case of that cachectic condition of the system of which *cancrum oris*, and ulceration and sloughing of other parts, are local manifestations. The child acquired sore mouth before any medicine whatever had been given, and it is denied by the medical attendant that any mercury was given during the treatment.

A low fever attended and followed the destructive process, with slow convalescence.

The attempt was first made to cover the ghastly opening in the cheek, intending afterwards to open the jaws, if practicable, and to secure the replacement of the lips. The third method, that of jumping, was adopted, making the base of the flap correspond with the supply of blood to the parts from the temporal artery. The dotted line around the opening in the cheek (Fig. 29.) indicates the amount of integument turned in to aid in supplying the deficient membrane. The margin was peeled up, in connexion with the periosteum, by means of a thick knife, and turned in, thus affording a broader incised surface

for attachment to the flap to be brought up from below. The dotted line upon the neck indicates the border of the flap to be turned up to supply the cheek. The extremity going as far as the median line of the neck was, when carried up, attached to the remnant of the lip beneath the nose. The attachment was made chiefly by interrupted sutures of iron wire, two or three pins being inserted to secure immobility, but without putting a twist upon them.

With this, and the subsequent operations, the bowels were first moved with castor-oil, and subsequent to the first three days after the operation, *i.e.*, subsequent to the period of gastric derangement from the anæsthetic, the system was sustained by citrate of iron and quinia, three grains three times a-day. This is conveniently dissolved in syrup of ginger and water. The anæsthetic given, was chloroform one part, and ether three parts, by measure. In the last operation, the mixture was, alcohol one part, chloroform two, and ether three, in accordance with a suggestion of the Chloroform Committee of the Medico-Chirurgical Society of London.*

Fig. 30.
The portion of the flap taken from the neck below the chin, is now in contact with the base of the nose. Its union with the left half of the lip is complete. This half of the lip is seen to have become drawn over to the right. This was permitted by its free dissection from the jaw.

The union was complete, and the child went home, in order that the internal cicatrization might become complete before the next operation. The result is seen in Fig. 30, from a photograph taken just three weeks from the day of the operation.

Second Operation, June 29, 1866. An incision was carried transversely across the neck, about an inch below the lower border of the inferior maxilla, and parallel with it, from a point in a vertical line with what should be the position of the cuspid tooth of the right side, to a point in a vertical line corresponding with the posterior molar tooth.

The dissection was made from below upward, to a line just

* See a review by Dr. J. C. Reeve, in *American Journal of Medical Sciences* for January, 1867, p. 186.

below the cicatricial margin of the skin. All above this line was turned up against the teeth, with the periosteum and the integument below this line separated from the chin with its periosteum by means of nippers, which scraped the bone. It had been the intention to avoid cutting the facial artery of the left side, in order not to impair the arterial supply, but it was accidentally cut off, and secured by a wire and needle.

The flap thus detached from the jaw, and its connexions upon the neck, was stretched across and attached to the previously pared edge of the new-made cheek of the right side. The new lower lip then appeared very well, concealing the lower teeth, but the point of the flap sloughed, probably in consequence of the accident of dividing the facial artery, and the lip, having no support, was gradually drawn down, so that there was finally little or no improvement.

The patient was kept in a bath of cool air during treatment. The bed was curtained around, by attaching quilts to the bed posts, and into an air trough thus made, a stream of air, passing first through fresh-burned coke, and then over ice, flowed constantly night and day, after the manner of Lyman's "Air Purifier." It was found that thirty pounds of ice would secure a supply of cool air for twenty-four hours.

Third Operation, April 12th, 1867. This was a repetition of the second operation, and equally unsuccessful.

Fourth Operation, May 13th, 1867. One month subsequent to the preceding operation.

The flap from the left side was brought up, as in the previous operations, and a loose portion of bone formed in the chin by the previous detachment of the periosteum was taken out. Then a flap was taken from the neck, upon the right side, and turned up a-quarter of a circle, (second method,) and attached to the flap brought from the left side, by pins and metalic sutures; the pins being used only with plasters on them, as already explained, in order not to produce ulceration or sloughing, as too often happens with the twisted suture. Union occurred, so perfect, that it is difficult to see where the surfaces join. The surface, however, is not yet high enough to hold saliva.

At this time, the natural portion of the upper lip was stretched across, so as to produce a level prolabium.

This was the plan pursued. A strip of the margin of the new-formed cheek, on the right side, was cut two-thirds through, toward the lining of the mouth, as far down as the angle of the mouth was intended to be made. A knife was introduced into the mouth, and a free incision was then made along the surface of the superior maxilla, as close to the periosteum as possible, and this strip of the margin of the artificial cheek was turned back within the mouth, in order to increase the surface of lining membrane, and to increase the fulness of the face, and to level out a depression existing in the line of the suture since the first operation.

Fig. 31.

Appearance subsequent to the fourth operation. Upper lip completely restored. The groove in the cheek nearly obliterated. A deficiency remains in the lower lip, on the right side. The dotted lines indicate the place for the next and final operation, by jumping.

Then a horizontal incision was made close under the nose, down to the bone, and the upper lip was loosened from the jaw, until it would readily stretch across, when it was fastened, partly with interrupted iron sutures, and partly with pins and plasters, as before explained.

The union here was also perfect, resulting in the improved physiognomy shown in Fig. 31.

It was in this case, that the advantages of the combination of chloride of zinc, 4 grains, with ½ an ounce each of glycerine and water, especially manifested the qualities of an antiseptic, of a solidifyer of purulent productions, without detaching the plasters, and of a stimulant to cicatrization.

Case IV. *Plastic Operation*, for converting a portion of the skin of the cheek into lining membrane for the mouth, on account of internal cicatrix following sloughing from salivation.

A German child, aged six years, was salivated at the age of three; the result of which, was a broad band of cicatrix in the

cheek of the right side, and a narrow band upon the left, so that the teeth were brought permanently into close contact.

My theory was, that it would do no good to divide the broad cicatrix, and stretch open the mouth, unless I could provide a substitute for the lost mucous and submucous tissues. This could only be done by turning in some of the skin of the cheek.

For this purpose, I made nearly a horizontal incision, from the corner of the mouth, nearly parallel with the base of the jaw, with a slight convexity downward, about an inch and a-half in length. This incision was made to go through the cicatrix into the mouth. Figs. 32. and 33.

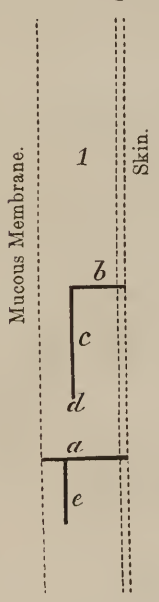


Fig. 32.

First Stage.

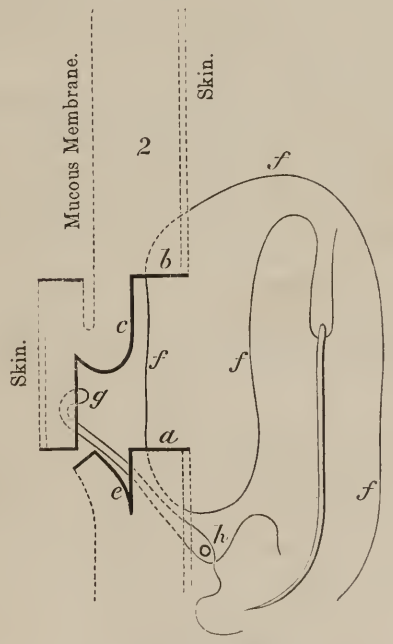


Fig. 33. Second Stage.

Method fourth, variety first. These diagrams illustrate, in profile section, a proceeding for converting a portion of the skin of the cheek, into lining membrane for the mouth.

a An incision carried entirely through into the mouth.

b An incision extending only half, or two-thirds, through the cheek.

c An incision carried directly down from the inner extremity of *b*, dividing the cheek into two layers.

d Flap, which in becoming inverted, is turned upside down.

e An incision carried downward, to increase the facility of approximating the surfaces of the skin.

f Suture, after its introduction, and before it is drawn.

g Suture, introduced with two needles, for the purpose of holding the flap in position. If this is metalic, it will cut its way out when desired.

h Bougie, over which the wire is twisted, in order to hold the inverted flap *d* in position.

I then opened the mouth, to some extent, by a screw-lever, but it was not until I had dissected to a greater extent, that this was accomplished. I cut away a necrosed portion of bone from the upper jaw, and cleared out a considerable cicatricial tissue. By acting upon the screw, the mouth was then made to open as far as any mouth ought to open. The bridle on the left side was torn across.

Having fully opened the mouth, I made an incision from the angle of the mouth backward, and above that previously made, and extending two-thirds through the thickness of the cheek. From the depth of this horizontal incision, another incision was carried down between the skin and mucous membrane, being

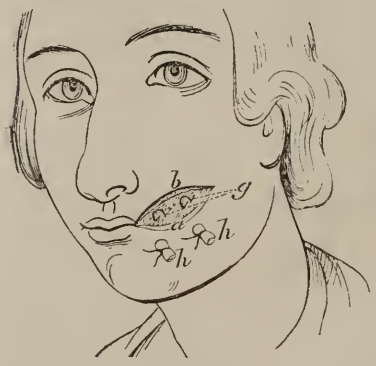


Fig. 34.

a Through incision as in the diagram, Fig. 32.

b Upper incision only part way through.

g Loop of the suture wire introduced into the inverted flap.

h The free ends of these loops tied over pieces of bougie.

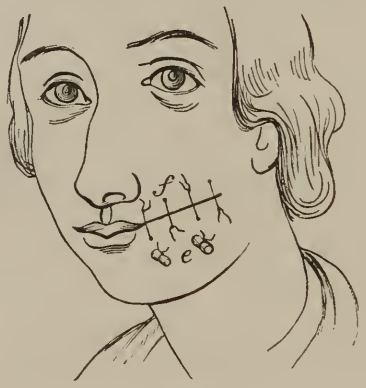


Fig. 35.

e Outer end of suture holding the flap, the same as *h* in Fig. 34.

f Sutures twisted alternately above and below the suture line.

careful not to cut through into the mouth, until I could turn the flap over, so as to make its cutaneous surface face inward.

Two sutures, each armed with two needles, were then passed into the raw surface of the flap, and out at the same surface, and then downward, through the undisturbed tissues, coming out near the base of the jaw, as shown in Figs. 32. 33. 34. and 35.

The edges of the skin were then brought together by interrupted sutures in the ordinary way. This expedient would not, of course, be available for a boy, on account of the beard in prospect. The skin must be taken from a higher part, or not taken at all.

This patient returned in 1866, six years after the operation, having a pretty good movement of the jaws, but with too great an encroachment at the angle of the mouth on one side, which was readily remedied by DIEFFENBACH'S operation.

Mending of the Lower Lip.

The complete restoration of the lower lip is the most difficult achievement in plastic surgery, but a half or a smaller portion may be restored, with scarcely any remaining deformity.

The plan of a V shaped incision, ascribed to CELSUS, and improved and perfected by MALGAIGNE, SERRE, BONNET, and others, is executed in this manner.

If an ulcer, a degeneration, or a tumor is to be removed, or if there exists a deficiency, previously formed, make two incisions, commencing in the lip, at the requisite distance from the part to be inclosed, bringing them together, well down upon the chin; at its very base if the space is large. The muscular tissue, and all degenerated tissue, are to be removed. Then cut under, along the surface of the periosteum, or under the periosteum, until the two incisions can be brought together with ease. The further management is like that of a harelip. If the nature of the case permits of the saving of some of the prolabium, on one side or both, in order to make some degree of elevation over the line of union, the chances for adhesion are increased, and a notch is less likely to result. In SERRE'S Atlas, there is a figure showing the preservation of the prolabium

complete, after the removal of a cancer of the chin, and this plan is advocated by SERRE as his invention.

Dr. MOTT, in one case, following the advice of SERRE, attempted to preserve the vermilion border of the lower lip, in the case of a cancer of the chin, but in a few days he suffered the mortification of seeing the *mortification* of the thin stratum of the lip, which he had attempted to preserve.*

The objections to this proceeding are, that the disease for which the operation is performed, usually involves the prolabium, and if it does not, the vermilion strip is so thin, when dissected off, as to be likely to slough, as in Dr. MOTT's case.

After the wound is dressed, as for a hare lip, the mouth is made symmetrical by DIEFFENBACK's operation. (See Fig. 37.) A figure is copied from MALGAIGNE, by HOLMES COOTE, (in Holmes' Surgery, Vol. III.,) in which the flaps, brought from the cheeks, with which to reconstruct the lower lip, have a horizontal incision upon their upper border, at the height of the angle of the mouth, by which it appears as though the upper lip were to be deprived of the possibility of entering into the construction of the lower. In the correct plan of operating, this incision, if made at all, should not be made until the upper lip has contributed as much as possible of its prolabium to supply the the lower lip: that is, this horizontal incision should not be made till the last stage, when it constitutes a part of DIEFFENBACH'S operation.

Malgaigne's Operation.—Two vertical incisions are made to the base of the maxilla, and these are united by a transverse, or horizontal incision. This latter is prolonged along the base of the jaw, in each direction. A horizontal incision is made from each angle of the mouth, so that there is, on each side, a quadrilateral flap to be drawn across the chin to meet its fellow.†

It will be seen, from a case to be detailed, (Fig. 37.) that I have advantageously modified this operation, so as to avoid

* Velpeau's Surgery, American Edition.

† Malgaigne's Operative Surgery, American Edition, 1851, p. 341. The description of the operation, in Malgaigne's work, is illustrated by a wood cut.

incising at the angles of the mouth, until the upper lip is first made to encircle the oral orifice, then greatly lessened in size, when DIEFFENBACHS' operation is performed, which secures a lower lip with a portion of the *obicularis oris*, and a considerable degree of mobility.

Fig. 36.

Second method, first variety. Syme's operation for restoring the lower lip.

The figure represents an epithelioma, which is removed by a curved incision on either side.

Both these incisions are then prolonged to the base of the jaw, and the resulting curvilinear triangles are cut under, and made to glide inward and upward, until considerable portions of the lower curved lines come in contact.

From Erichsen.

How greatly superior this proceeding must be to that of SYME, (Fig. 36.) will be seen at a glance, for SYME'S operation cannot afford a natural prolabium.

A complete destruction of the lower lip, unless there is great mobility of the face, does not easily admit of reconstruction by this simple plan, at one operation.

A horizontal incision, made some distance below the line of the angles of the mouth, permits a more easy approximation of the angles of the mouth, than a V shaped incision. To avoid too much fulness of the chin, a V shaped portion may be removed. These two expedients, combined, are represented in Fig. 37.

The flaps above the horizontal line, admit of being pointed into wedge-shaped pieces, for lapping upon each other, so as to diminish the danger of their being pulled apart.

This boy (Figs. 37. and 38.) suffered the loss of nearly all his lower lip, at eight years of age, from the influence of mercury. No other injury was done.

The plan of the operation consisted in making a horizontal incision, indicated by a dotted line, in Fig. 37. and freely dissecting up all above that line, from its attachment from the lower jaw. A triangular portion of the integument was dissected out from one side of the chin, to avoid too great fulness in contrast with the parts above the horizontal line. The ends of the flaps

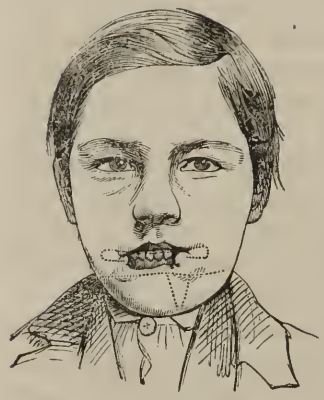


Fig. 37.

Destruction of the greater portion of the lower lip. The dotted lines upon the chin, indicate a modification of Malgaïgne's operation. The dotted lines at the angles of the mouth, indicate the amount of skin removed in Dieffenbach's operation, performed at the last stage of the process.

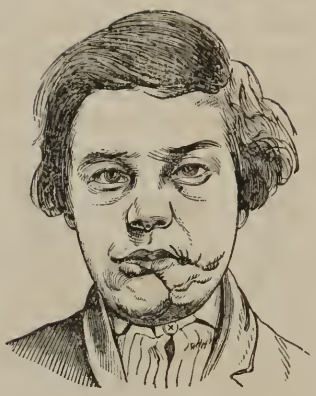


Fig. 38.

The result. The prolabium and the angles of the mouth, are very perfect. A scar resulted from the V shaped incision.

from the opposite sides, were truncated, and brought together, so as to present an even prolabium. The angles of the mouth, at the last stage of the operation, were extended, by DIEFFENBACHS' method, so as to restore the original length of the labial fissure. The dotted lines at the angles of the mouth, indicate the amount of skin removed in lengthening the lips.

Fig. 38. shows the result. The new made lower lip has its natural mucous membrane, and the functions are very well performed, only, that the boy cannot whistle. A deep scar upon the chin, shows a bad union of the sides of the V shaped incision. This, however, will ultimately be covered with beard.

The practicability of substituting a complete loss of the lower lip by tissue containing muscle and mucous membrane forming a prolabium of natural appearance, will be shown by the following case:—Figs. 39. and 40.

CASE VI.—*Restoration of lower lip complete.* Jacob Yazell, *æt.* 30, apparently of good constitution, good appearance, black

Fig. 39.

Epithelioma of the lower lip, involving its entire extent. Removal by a semi-circular incision; an incision on each side, along the base of the jaw; a dissection of the flap, embraced by the dotted lines from the jaw, and an approximation of the two angles of the mouth. The mouth thus constituted entirely of the upper lip in a circle, was enlarged in a later stage of the operation, by Dieffenbach's method.

Fig. 40.

A natural prolabium performing the functions of the lip. Photographed six months after the operation.

hair, and never sick in his life. An epithelioma upon the lower lip, as shown in the figure (Fig. 39.), of several years growth, extends entirely from one angle of the mouth to the other, and down to the base of the chin. It rises up so as to hide the lower teeth. October 12th, 1859, I determined to attempt a modification of the process of MALGAIGNE.

After etherizing the patient (ether 3 parts, chloroform 1 part, by measure) I made a horizontal incision across the jaw, along the base of the tumor. This aroused the patient somewhat, but in a few minutes he was fast asleep again. The vessels streamed finely, and I thought it best to tie some of them before proceeding to make the curvilinear incisions on each side, and to remove the tumor, including the degenerated lip from the chin. The next step, was to extend the horizontal incision first made, and to dissect up the cheek from the lower jaw-bone. The flaps were then brought together temporarily,

which reduced the mouth to a pucker, made by the upper lip exclusively.

Having introduced a temporary suture, to hold the parts in position, the angles of the mouth were extended after DIEFFENBACH'S method. When the parts had been finally brought together, I found the new lower lip rise higher than natural, which was a good fault. The incisions had been so made that one portion of the new prolabium made something of a lap upon the incision upon the other side. This was purposely effected, in order that if the suture gave way below, it might be more likely to adhere at the top, as some degree of recession would be compatible with union, and this, indeed, insured my success.

Three kinds of sutures were employed—the twisted suture, the interrupted silver suture, and the interrupted suture with silk. Adhesive plaster was applied over the sutures, and after all was done, it was ascertained that the patient had been asleep an hour and a-half.

The patient did very well, the pulse never rising above 80. Adhesion occurred above where the lap was made, but failed below. The fistula which resulted, gradually filled by granulating and drawing in the opposite margins, but the patient did not wait for this, going home ten days after the operation, a distance of sixty miles. I have not seen him since, but six months afterwards he sent me his photograph, which has been reproduced in Fig. 40. I have occasionally heard from him, and the cancer has not returned. The advantage of this plan, over that of SYME (Fig. 36.) or that of MALGAIGNE, is obvious enough.

In more detail. *13th*, the second day. There is good circulation about the wound, is comfortable, has taken 3 grains of morphia within the twenty-four hours following the operation. The bowels have moved freely, notwithstanding the morphia. He drinks water by means of a syringe, without any assistance.

14th, third day, morning. Pulse 80. Says he suffers no pain. This morning there was considerable erysipelatous swelling of the left cheek, and around the eye of the same side, but none in the immediate vicinity of the wound. Gave 10 grains

quinia and ¼ grain morphia, and some beef-tea, all by injection. He desired very much to pass this off, but by much encouragement he held it fast. Nitrate of silver was freely applied over the inflamed region. *Night.* Pulse 80, swelling nearly gone. He has taken some beef-tea by the mouth, from a syringe, and says that it tasted good. Injection of 10 grs. quinia, 1 drachm of laudanum, ¼ ounce alcohol, in some beef-tea. Altogether, he has taken to-day 5 grs. opium. The wound looks well, and a general union has probably taken place.

16th, fifth day. Pulse 80. Drinks beef-tea, and takes 10 grs. quinia and 1 grain of morphia by injection. The portion of the wound united by the silver suture has done well, but the portion held by the twisted suture has done badly. The portion of the wound along the lip has united, and the greater part of the horizontal portion. The central portion of the vertical suture has failed to unite, and under the threads of each twisted suture, there is a slough.

21st, tenth day. No febrile excitement, the pulse ranging from 70 to 80. A considerable opening remains, which will have to be closed by another operation. (In this I was mistaken, it closed itself.)

23d, twelfth day. Went home, to return again after a while. (In this, again, I was mistaken; he had no occasion to come back.)

Nothing could be more satisfactory, than the beneficial effects of quinia and opium in this case.

French Method.—To supply the loss of the lower lip, CHOPART brought a parallelogram from the neck to cover the chin, and to make a lower lip in accordance with the fourth variety of the first method, by direct extension of the skin of the neck, the dissection going down as low as the hyoid bone. The retraction, by this plan, must always be such, that the new lip will fail to hold saliva.

Indian Method, Applied to the Lower Lip.—VELPEAU* says that "DELPECH was the first to apply the Indian method to anaplasry to the lips. After having dissected his flap upon

* Operative Surgery, Vol. i., p. 640.

the hyoidean region, he raised it, twisted it upon itself, and doubled it upon its cellular face, before attaching it, by numerous points of suture, to the two sides of the deformity, which had been previously pared." The operation was not successful.

Figs. 41. and 42. taken from Zeis, affords a very clear conception of this awkward plan, which is chiefly interesting as a point in the progress of the art.

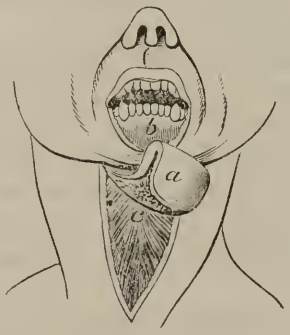


Fig. 41.

Indian method; 3d method, 2d variety, applied to the lower lip, from Zeis.

a Flap taken from the neck.

b Space upon the chin to be filled.

c Space denuded in removing the flap.

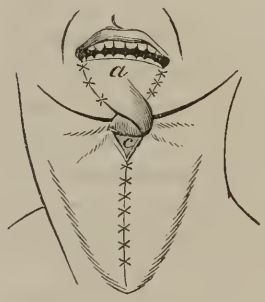


Fig. 42.

Third method, 2d variety, applied to the lower lip. Operation completed.

a Flap applied in its new position.

c A small portion of raw surface left uncovered.

Repetition of Figs. 11 and 12.

In constructing a new lower lip out of material which does not afford muscular structure, and when it is impossible to produce a prolabium covered with a mucous membrane, the most difficult achievement, is to constitute a barrier to the discharge of saliva.

For this purpose, it is necessary to give the new lip such a degree of firmness, as will, in the absence of muscular fibres, enable it to stand up, in front of the teeth, acting as a rim of lifeless substance. In order to secure this, there is no expedient to be relied upon, but that of incorporating into it, a strip of periosteum, which must be obtained from the front base of the jaw-bone. This reproduces new bone to a small extent, and gives fixedness, to the newly made lip.

If the method by direct sliding from below, is resorted to, it is necessary to detach the upper border of the flap to be elevated, by employing a thick knife or a chisel, introducing it where the integument is attached to the bone, (in cases in which the lip has been previously lost;) and at the time of the removal of the affected parts, when the case is one in which the removal of diseased tissue, and the supplying of the deficiency are made parts of the same operation. One is enabled, by this means, to peel up the periosteum, in connection with the superimposed integuments, and if some bony material is detached along with the periosteum, no harm is done, for if it lives, it helps to make the rim, and if it does not, it escapes with the purulent discharge. If the better method of sliding in a curved direction is adopted, it is very easy to take up the periosteum in connection with the integument, on the base of the jaw. A heavy knife, or a chisel, answers very well, but the most convenient instrument is a large pair of nippers, the lower blade placed below the flap to be removed, and the upper blade above it, so that, on the approach of the blades to each other, the bone is effectually peeled of its periosteum and integument.

Again, if the jumping method is employed, the upper border of the flap to be transplanted, is made to lie along the base of the jaw, and the dissection must be so made, as to include the periosteum with the integument, so that when the flap gets its new position, the periosteum from the base of the jaw, will apply in front of the teeth, and the lower border of the flap brought from the neck, will be above the strip of integument left in its natural position upon the chin. The lower border of this undisturbed integument, will thus attach itself to the bone, and be prevented from sliding down upon the neck, and the cicatricial contraction to close the space laid bare upon the neck, will be resisted above by the maxilla, which is held by the masseter and the temporal muscles, and the movable skin upon the neck will gradually rise to lessen the breadth of the cicatrix, finally leaving only a line beneath the jaw, which is invisible except when the chin is elevated. This is believed to be a new expedient, and one which will prove of great value in

securing a lip capable of holding saliva, where it is impossible to give it muscular substance moving automatically, or under the influence of the will.

Fig. 43.
Cicatricial contraction from burn. From Mütter.

Depression of the Lip without its Destruction. — This condition results from burns. The lower lip becomes completely everted, and drawn down to a level with the shoulders, the lower front teeth project forward, and the saliva runs continually down the neck, keeping the clothing constantly wet. Figs. 43. 44. and 45. from MÜTTER, (in Pancoast's Surgery), illustrate this condition, though not in the most extreme degree.

Fig. 44.
Plan of operation.

This deformity, in Dr. MÜTTER'S case, was, in great part remedied by cutting transversely across the cicatricial bands in front of the neck, and dissecting up a large flap, six inches and a-half long, and five inches broad, from the shoulder, and placing it in the gap in front of the neck.

Dr. MÜTTER, in commenting upon his own case, gave the advice to take two flaps, one from each shoulder, instead of taking the whole of the migrating integument from one side.

In this connection, the following extract, from T. P. TEALE, Esq., of Leeds, England, (from *Ranking's Abstract*, July to December, 1858, No. 26, p. 154, from a Report in the *Transactions of Provincial Medical and Surgical Associations*, Vol. XII.), will be interesting:

"In 1839, Mr. CARDEN, of Worcester, operated upon a girl

Fig. 45.
Completion of operation.

14 years of age, who was deformed by a burn, which occurred seven years before. The movements of the head were much restricted. The mouth was permanently open, the tongue protruded, the lower incisors projected horizontally, and there was constant dribbling of saliva.

"A transverse incision was made, throughout the entire cicatrix, in front of the neck. The chin was then drawn upward, and every tense band, connected with the cicatrix, was divided, until the head was relaxed nearly to its natural position.

"A flap of skin, three inches long, and two inches and a-half wide, was detached, on each side, from over the clavicle and chest. These were raised, and united in front of the throat.

"The degree of improvement effected in this case, and tested by the lapse of four years, was highly gratifying."

The account does not state that the lip would hold saliva.

Mr. TEALE confirms the injunction of MÜTTER, that "The incision of the scar should extend from sound skin on one side, to sound skin on the other, and every band of adventitious fibrous tissue, beneath the scar, should be divided, until the bottom of the wound discloses a loose, healthy cellular tissue."

TEALE cautions against stretching the flap. He attaches one free border by sutures, and afterward, does much by strapping, to correct the deformity.

According to this report, Dr. MÜTTER'S first operation was subsequent to CARDEN'S.

TEALE has operated 7 times since 1848, with improvement in all the cases.

"The displacement of the lip was mitigated by the operation on the neck, but in several cases, this particular deformity remained to such an extent, as to render a special operation for the restoration of the lower lip subsequently necessary."

This is an ingenious device, making a new lip upon top of the old one, which is allowed to remain upon the chin, with its mucous membrane exposed in front.

The method of direct sliding of the cheeks is adopted.

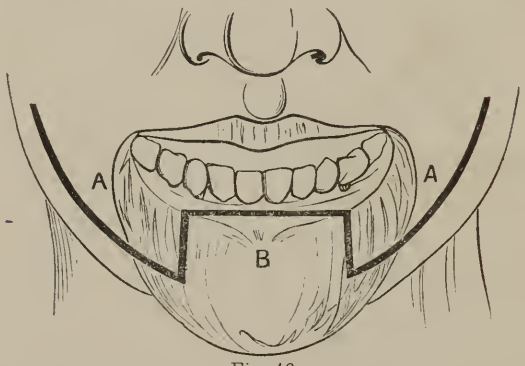


Fig. 46.

Teale's operation for extreme cicatricial depression of the lower lid.

A A Two flaps, one upon either side of the cheek, terminating in a vertical line corresponding with the canine teeth. The upper extremities of these vertical incisions are united by a horizontal incision through the everted vermilion of the lip.

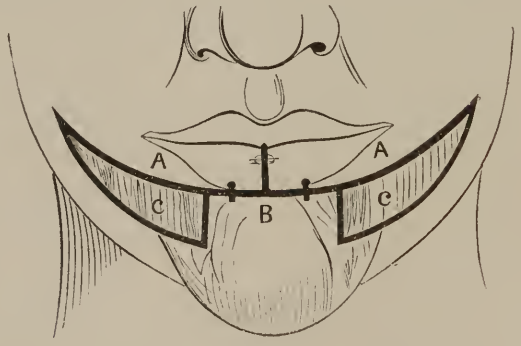


Fig. 47.

The flaps *A A* are brought together, and united in the median line over the letter *B*, thus making one lip on top of the other. The spaces *C C*, left raw by the removal of the flaps, are allowed to heal by granulation.

The operation is thus described, Figs. 46. and 47.:—"Two vertical incisions, about three-quarters of an inch in extent, are made through the everted lip, down to the bone. These inci-

sions are so placed, as to divide the upper portion of the everted lip into three parts, the middle being equal to one-half the natural breadth of the lip, while the two lateral portions are each equal to one-fourth. From the lower end of each vertical incision, the knife is carried in a curving direction, outward and upward to a point about one inch from the angle of the mouth, opposite the second molar tooth of the upper jaw. The two flaps, thus marked out and deeply incised, are then separated from the bone, the mucous membrane uniting them to the alveoli being freely divided. Lastly, a bare surface is made along the alveolar border of the middle portion of the everted lip, between the upper extremities of the two vertical incisions first made. The lateral flaps are then drawn together, above the middle portion of the everted lip, and united in the median line by twisted sutures, and to the incised surfaces beneath. In this way, the new lip is built upon the middle portion of the old one."*

This operation of TEALE is a confession of the impossibility, in the worst cases, of restoring the position of the lower lip, by implanting upon the front of the neck and chin, sound skin taken from the neighboring parts. Flap after flap, may be turned in from the chest and shoulders, and the lip may be brought into perfect position; but, as the parts heal, and the flaps contract, the lip is again depressed, and before the success becomes complete, the patient or his guardians become discouraged, thinking the operation a failure, and the success which is practicable, fails to be attained.

Yet, it is not only of the highest importance, to accomplish this result in the end, but to accomplish it early in the treatment.

By securing, early in the process, a lip which will hold saliva, the patient and his friends are encouraged, and the surgeon is permitted to go on, and relieve the unsightly bridles upon the neck.

For this purpose, a *line of immobility*, upon the chin, should be secured.

* *Ranking's Abstract*, No. xxvi., July to December, 1857.

Make an incision transversely beneath the jaw, so as to be certain of having an ample supply of integument for the lip and chin when they are restored to their position upon the anterior surface of the central portion of the lower jaw. Then dissect up the integument until it comes easily into its natural position. After this, scrape up the periosteum, along the base of the lower jaw, so that the skin, at the base of the replaced flap, may form a close union with the bone, and be relieved from the subsequent traction of the cicatrix below.

The force of the cicatrix-contraction, then comes upon the bone, and is counteracted by the masseter and the temporal muscles, until, by other operations upon the chest or the sides of the neck, a supply of sound integument is brought to the spaces before occupied by the cicatrices, so as to restore to the surfaces their natural elasticity.

The dotted line, Fig. 48. illustrates the transverse incision to be made for the elevation of the lip, and the exposure of the base of the jaw, in order to peel up from it, a strip of periosteum. There is danger that the operator may be tempted not to make this incision low enough down upon the neck.

The following case, is an instance of success by this expedient, after failure in the attempt to elevate the lower lip by implanting sound integument upon the neck and chin derived from below.

Case VII. *Great depression of the lip from a burn upon the face, neck, and chest.* — Louisa Smith, aged four years, was severely burned at the age of two years, from which there resulted a dense column of cicatrix, from the chin to the middle portion of the sternum. The sides of the neck were also involved in the injury, so that the shoulders became elevated, and the chin and lower lip were drawn down to such a degree, that the lower lip and top of the shoulders were in the same horizontal line. The lower jaw was bent, so that only the posterior molars touched, and the incisors pointed nearly horizontally forward.

December 13th, 1862. An extensive dissection was practised upon a bad plan, that of making flaps with bases toward the

Fig. 48.

Great depression of the lower lip, from the contraction of a broad cicatrix upon the neck and chest, rendering it impossible to elevate the lower lip.

Fig. 49.

Success by establishing a line of immobility.

The mouth habitually closed, but strong cicatricial bands still remain upon the lateral parts of the neck.

jaw, including sound skin in the neighborhood of the shoulders, and having cicatricial material in their bases. The lip was elevated for the time being, but the flaps, in great part, sloughed off, and the resulting cicatrization again depressed the lip, but not to the previous extreme degree.

The new cicatrix had less firmness and thickness than the old.

Second operation, March 26th, 1864. In this operation, an attempt was made to implant sound skin in the central line, so as to get a central column of sound skin, by sliding flaps in a circular line, in accordance with the second method, leaving, unavoidably, some of the surfaces robbed of skin, to become covered again by granulation.

The flaps in the neck united in part by adhesion, and a column of sound skin was obtained in place of the cicatrix. Still, a band upon the left side prevented her tying her bonnet string under her chin, and the lip became again depressed, though not beyond the power of closing it to the upper lip by a strong effort.

Third operation, March 21st, 1865. In this operation, the plan of the previous operation was still further prosecuted, with improvement, but still the lip did not hold saliva.

Fourth operation, March 26th, 1866. More sound skin was worked in upon the neck, but still the lip leaked saliva.

Fifth operation, January 14th, 1867. In this operation, I employed a new expedient, which, it is believed, will be of immense value in similar cases. This consists in establishing a line of immobility, to shield one part from the traction of another. This is done, by peeling up the periosteum, so that the adjoining tissues may become cemented to the bone. The dotted line, in Fig. 48. indicates the line of incision which should be carried to the base of the jaw. The periosteum should then be scraped up, so as to constitute a part of the flap elevated. The soft parts constituting the chin, including the periosteum, should then be carried up until the lips are brought into easy approximation. The lower lip should then be kept in position, by means of wire sutures going into the cheek, and by adhesive strips.

The denuded bone should be allowed to heal over by granulation. If an exfoliation occurs, no harm can result, except a prolongation of the cicatrization.

This expedient was found to answer the purpose. The result is shown in Fig. 49.

After the first three operations, an iron frame work, well padded, (in the style of Fig. 17.) was worn for several days, to secure against motion of the neck, but the last two operations were limited to the lower jaw, and the confinement was not necessary.

AUTOPLASTY OF THE URINARY AND GENITAL ORGANS.

A Remarkable Case of Extroversion of the Bladder successfully covered by a Pouch of Skin, by Gliding, Inversion, and Tubulation by Dr. Daniel Ayres, *of Brooklyn, New York.*

Prof. Erichsen, of University College, London, speaking of extroversion of the bladder says:—"The malformation is incurable. Operations have been planned and performed, with the view of closing in the exposed bladder, by plastic procedures, but they have *never* proved successful, and have terminated, in

some instances, in the patient's death. They do not, therefore, afford much encouragement for repetition."

This is an expression of the opinion of the medical profession, and in this view, the following successful operation will appear the more brilliant.

Fig. 50. illustrates the nature of the deformity, and the plan of the operation.

Fig. 50.

a. The posterior wall of the bladder, continuous with the abdominal parietes, (there being no anterior wall for the bladder,) one inch and a-quarter by two inches, and longer when standing.

b, *b*. Nymphæ, or labia minora, separated wide apart.

c. Orifice of the vagina.

d. Anus.

o, *o*. Labia majora. There was no trace of urethra or clitoris. There was a deficiency of the symphysis of the pubes, leaving the mons veneris without its natural osseous support, and the thighs, as shown in the cut, to stand apart in front to an unnatural degree.

The patient, 28 years old, had borne a child at maturity, and became afterwards afflicted with procidentia of the uterus, which appeared externally.

Plan of the Operation.—A flap of the integument upon the anterior wall of the abdomen, was dissected from above downward, corresponding with the figure, *e*, *h*, *g*, *i*, *f*. This flap was doubled upon itself, so that *h* came to *j*, and *i* to *k*, and a line of dissection was made from *e* to *j*, and from *f* to *k*, in order to attach the borders *e*, *h*, and *f*, *i*. The triangle *h*, *g*, *i*, would thus make that of *j*, *e*, *k*, but instead of this, it was turned up to make that of *j*, *n*, *k*. Thus, the bladder had for the time, an anterior covering made of two layers of the same flap, the raw surfaces facing each other. A wide opening was thus left below, for the escape of the urine, to avoid urinary infiltration, and to afford room for swelling.

The integument, on the outside of the line, *j*, *e*, *h*, *g*, and of the line *k*, *f*, *i*, *g*, were then cut under, and made to glide to the median line, so that the line, *j*, *e*, came to the line, *j*, *n*, and the line, *k*, *f*, to *k*, *n*, *i.e.*, the borders of the triangular portion of the flap which had been turned up, and the lines, *e*, *h*, *g*, and *f*, *i*, *g*, were made to meet in the median line. Thus, no raw surface was left uncovered by skin.

The parts united, in great part, by adhesion.

This operation was performed on the 16th of November, 1858, and on the 7th of December following, *i.e.*, after the lapse of just three weeks, the patient submitted to the second and final operation.

The lower triangular flap, *j*, *n*, *k*, was dissected from the recent temporary attachments, both lateral and deep, and turned down over the vulva, as indicated by the dotted line, *j*, *c*, *k*.

Two, incisions, *j*, *l*, upon the right side, and *k*, *m*, upon the left, were next carried from the external angles of the triangle, perpendicularly downward, just on the outside of the nymphæ. The integument on the outside of *n*, *j*, *l*, upon the right, and *n*, *k*, *m*, upon the left, was freely cut under, until these two lines could be made to approach each other, and coincide in a line drawn from *n* to *c*, which was continuous with the cicatrix previously established from *g* to *n*, occupying the linea alba. The labia majora were thus made to approach each other, and the nymphæ were concealed.

A space was left for the urinary canal, which would admit the little finger, and the new formed urethra was an inch and a-half in length.

During the operation, torsion and ice were applied to several arteries which bled freely, after which, the flaps were confined in the median line by interrupted sutures, the most inferior one at *l* and *m*, being made to include the point of the triangular flap, *c*. The spaces between the sutures, were covered with patent lint soaked in collodion, and the labia majora were covered with strips of muslin saturated with collodion, the whole dressing being retained by threads of suture-silk, laced across in front. Adhesion was nearly perfect.

After a years' time, it was found that the weight of the abdominal contents, in the erect posture, caused the anterior fold of the vagina, alone, to descend a short distance, forming a pale œdematous tumor of the size of an "English walnut." The anterior fourchette of the vulva remained firm and resisting, and a perforated rubber pessary, introduced into the vagina, retained the parts in position.*

Autoplasty of the Penis.

DIEFFENBACH'S operation for hypospadias, by the third variety of the first method, retaining a catheter until the central suture has united, leaving the new-formed ellipses, made

* *Virginia Medical Journal*, January, 1859, and a pamphlet of 16 pages, published by Hall, Clayton & Co., N.Y., 1857.

by the separation of the parallel incisions to close by granulation, is a very simple operation, though it must often fail and require to be repeated, in consequence of the impossibility of always keeping the urine from flowing over the incisions.

A more complicated operation, by tubulation, for the relief of stricture in the anterior portion of the urethra has been recently practised by T. P. Teale, of Leeds, England. A sloughing cancer had resulted in the permanent closure of the anterior two inches of the urethra. Mr. Teale, following the suggestion of Mr. Wheelhouse, operated in this manner;

"The loose skin covering the penis having been reflected from the corona glandis backward, like an inverted glove, until the anterior two-thirds of the penis was completely denuded, the healthy urethra was opened behind the stricture, and the cicatrix and stricture were slit up as far as the open urethra. A catheter was then introduced into the bladder, and laid in the newly-made groove in the strictured urethra. Lastly, the reflected skin was drawn forward over the denuded penis and the catheter, and stitched to the base of the glans."

A narrow ring of prepuce sloughed, but the result was perfect.*

Another plan, for employing skin with which to supply a small extent of deficiency of the urethra, may be practiced thus: First, secure an opening, for the escape of urine, at least an inch behind the seat of the stricture; then dissect up a flap of skin, with its base on the median line of the inferior surface of the penis, beneath the stricture, and its apex reaching, on one side, half way round the penis.

When this flap is dissected up, cut under its base, into the bed of the stricture, and pass a slippery-elm bougie from the meatus backward through the fistula created behind the stricture; then draw the flap under the bougie, and retain it there until adhesion is secured. The two ends of the bougie are then brought together in front and tied, so that there can be no possibility of displacement. The urine thus flows out alongside of

* *Ranking's Abstract*, xlv., July, 1867, p. 186, from *Lancet*, May 11, 1867.

the bougie where it is bent upon itself, until it is finally withdrawn, and the artificial fistula brought together.

After the adhesion of the flap in the bed of the stricture, the opening over the cutaneous surface of the flap is closed by the first variety of the first method. The seat of the stricture is effectually shielded from the contact of urine, by the escape through the fistula, created for the purpose farther back.

After the tubulation has been effected, the posterior fistula is closed in the same way. The result, is a portion of the urethra constituted of skin, which, by the occasional passage of a bougie for a while, will be likely to remain of sufficient size.

The plastic operations for vesico-vaginal and recto-vaginal fistules, rupture of the perinæum, and kindred operations upon the female genito-urinary organs, require to be treated with some degree of completeness, or not at all. The length which this report has already attained, forbids its further prolongation.

Among the sources of information upon the modern methods are—

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Hayward's Surgical Reports. Boston: 1855.

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Diseases of Female Organs of Generation, in Holmes' Surgery, Vol. IV., p. 536.

Emmet on Vesico-Vaginal Fistula, in *American Journal of the Medical Sciences*, October, 1867.

D. Hayes Agnew's Monograph. Philadelphia: 1867. Republished from the *Philadelphia Medical and Surgical Reporter*, 1866, etc., etc.

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